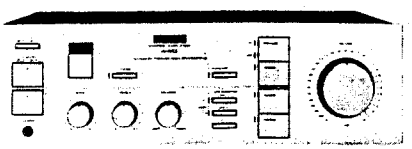
PIONEER®

Service Manual

CIRCUIT DESCRIPTIONS
REPAIR & ADJUSTMENTS



ORDER NO.
ARP-318-0

STEREO AMPLIFIER

A-60

MODEL A-60 COMES IN FIVE VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	AC120V only	U.S.A. model
HE	AC220V, 240V (Switchable)	European continent model
HB	AC220V, 240V (Switchable)	United Kingdom model
YP	AC240V only	Australia model
HEZ	AC220V, 240V (Switchable)	West Germany model
S	AC110V, 120V, 220V, 240V (switchable)	General export model

- This service manual is applicable to the KU type. For servicing of the HE, HB, YP and S types, please refer to the pp. 27~29. For servicing of the HEZ type, please refer to the additional service manual.
- Ce manuel d'instruction se refère au mode de réglage, en français.
- Este manual de servicio trata del método de ajuste escrito en español.

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YZ © JUNE, 1983 Printed in Japan

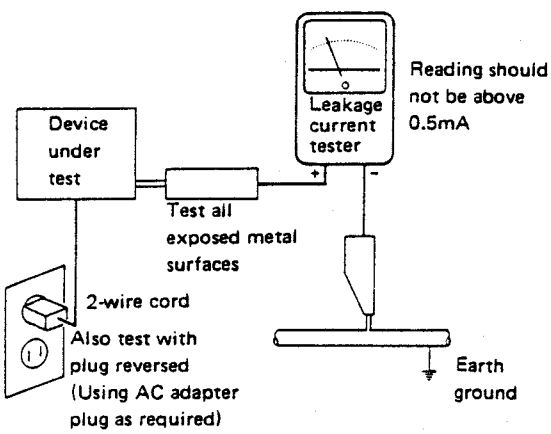
1. SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.


Reading should not be above 0.5mA
Leakage current tester
Device under test
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

2. SPECIFICATIONS

Amplifier Section

Continuous average power output is 100 watts* per channel, min. at 8 ohms from 20 hertz to 20,000 hertz with no more than 0.007% total harmonic distortion**.

Continuous Power Output at 1 kHz (both channels driven)
- T.H.D. 0,007%, 8 ohms ..... 120 watts per channel
- T.H.D. 1%, 8 ohms ..... 130 watts per channel (DIN)
- Damping Factor (20 hertz to 20,000 hertz, 8 ohms) 60

Input (Sensitivity/Impedance)
- PHONO MM ..... 2.5 mV/50 kilohms
- PHONO MC ..... 0.2 mV/100 ohms
- TUNER, CD/AUX, TAPE PLAY 1, 2 ..... 150 mV/50 kilohms

Phono Overload Level (T.H.D. 0.005%, 1,000 Hz)
- PHONO MM ..... 200 mV
- PHONO MC ..... 17 mV

Output (Level/Impedance)
- TAPE REC 1, 2 ..... 150 mV/2.2 kilohms

Frequency Response
- PHONO MM (RIAA Equalization) ..... 20 Hz to 20,000 Hz ±0.2 dB
- TUNER, CD/AUX, TAPE PLAY 1, 2 ..... 5 Hz to 100,000 Hz $^{0}_{-3}$ dB

Tone Control
- BASS ..... ±10 dB (100 Hz)
- TREBLE ..... ±10 dB (10 kHz)

Filter
- LOW (SUBSONIC) ..... 15 Hz(−6 dB/oct)
- Loudness Contour (Volume control set at −40 dB) ..... +6 dB (100 Hz), +3 dB (10 kHz)

Hum and Noise (IHF, short circuited, A network)
- PHONO MM ..... 86 dB (2.5 mV)
- PHONO MC ..... 70 dB (0.25 mV)
- TUNER, CD/AUX, TAPE PLAY 1, 2 ..... 105 dB (150 mV)

Hum and Noise (DIN, continuous power/50 mW)
- PHONO MM ..... 74/61 dB
- TUNER, CD/AUX, TAPE PLAY 1, 2 ..... 88/62 dB

Miscellaneous

Power Requirements ..... KU model; AC 120 V, 60 Hz
HB, YP models; a.c. 240 Volts~, 50 Hz
HE model; a.c. 220 Volts~, 50 Hz
S model; 110/120/220/240 V (switchable), 50/60 Hz

Power Consumption ..... KU model; 170 W (UL)
HE, HB, YP models; 700 W (max.)
S model; 220 W

Dimensions ..... 420 (W) × 130 (H) × 331 (D) mm max.
16-9/16 (W) × 5-3/16 (H) × 13-1/16 (D) in.

Weight (without package) ..... 9.4 kg (20 lb 12 oz)

Furnished Parts

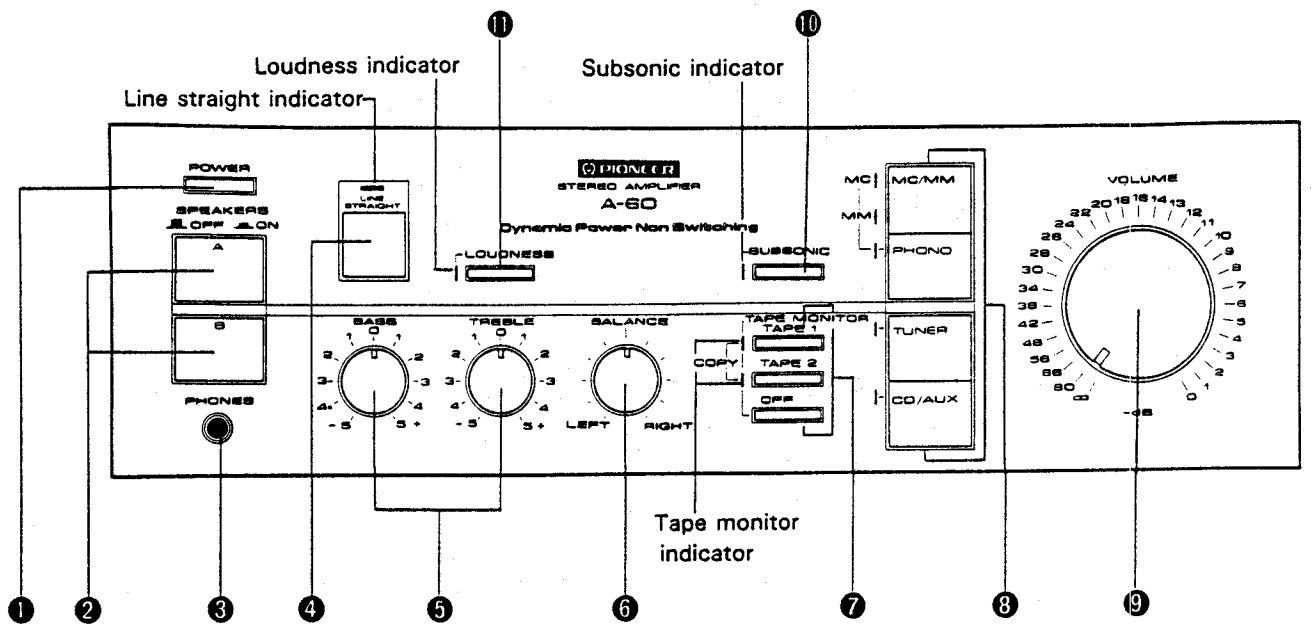
Operating Instructions 1

** Measured pursuant to the Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier.*

*** Measured by Audio Spectrum Analyzer.*

NOTE:
Specifications and design subject to possible modification without notice du to improvements.

3. FRONT PANEL FACILITIES



❶ POWER SWITCH

Power is supplied to the stereo amplifier when the switch is depressed. When the switch is released, the power is turned off.

❷ SPEAKER SWITCHES

Two sets of speakers can be used.
Depress the switches to turn ON. Release to turn OFF.

A ..... Sound is heard from the speakers connected to the Speaker A terminals.

B ..... Sound is heard from the speakers connected to the Speaker B terminals.

- Speakers A and B can also be used simultaneously. If using both, depress both Speaker A and B switches.

NOTE:
When only one set of speakers is used, the impedance is different from that obtained when two sets are used.

❸ PHONES JACK

Connect the plug on your headphones to this jack. To listen to a program through the headphones, turn both the SPEAKER A and B switches to OFF position.

❹ LINE STRAIGHT SWITCH

When the switch is depressed to the ON position, (the Line Straight indicator lights up) the signal from the input jacks is sent directly to the power amplifier, without passing through the tone control circuit or the loudness circuit, and consequently a flat frequency is obtained.

❺ TONE QUALITY (BASS AND TREBLE) CONTROLS

The controls can be adjusted when the LINE STRAIGHT switch is set to OFF position. (The Line Straight indicator turns off)

BASS CONTROL ..... Adjusts the quality of the Bass (Low frequency range) sound.
When the control is turned counter-clockwise from the central "0" position, the bass is attenuated. When turned clockwise, the bass is stressed.

TREBLE CONTROL .. Adjusts the treble (high frequency) sound.
When the control is turned counter-clockwise from the central "0" position, the treble is attenuated, when turned clockwise, the treble is stressed.

❻ BALANCE CONTROL

This control is used to balance the volume of the left and right channels. If the sound appears to be weaker from the right speaker, turn the BALANCE control clockwise (↷). If the sound is weaker from the left speaker, turn the control counter-clockwise (↶).

❼ TAPE MONITOR SWITCHES

Used when playing back a tape or monitoring a recording. The stereo amplifier has tape jacks for 2 systems. Recording and playback are possible with 2 tape decks connected. Furthermore, both simultaneous recording using both tape decks or copying from one tape to another are possible.

TAPE 1 ..... Depress this switch when playing back a tape or monitoring a recording on the tape deck attached to TAPE 1 jack on the rear panel.
Also, depress this switch when copying a tape from the tape deck attached to TAPE 1 jack to the tape deck attached to TAPE 2 jack on the rear panel.

TAPE 2 ..... Depress this switch when playing back a tape or monitoring a recording on the tape deck attached to TAPE 2 jack on the rear panel.

OFF ..... Leave in OFF normally.

❽ FUNCTION SWITCHES

These switches select the program source. A function indicator is attached to the left side of each FUNCTION switch. When pressed, the indicator lights up.

MC/MM ..... When playing a record on the turntable, adjust the switch to correspond to the cartridge being used. Confirmed by the MC or MM indicator that lights up.

PHONO ..... Depress for playing records on a turntable connected to the PHONO jack on the rear panel.

TUNER ..... Depress for listening to a program on a tuner connected to the TUNER jacks on the rear panel.

CD/AUX ..... Depress for listening to the sound from a stereo component connected to the CD/AUX jacks on the rear panel. (for eg. Compact Disk Player or TV tuner, which can be bought separately).

NOTE:
Since the TAPE MONITOR switches have priority over the FUNCTION switches, turn the TAPE MONITOR switches to OFF.

❾ VOLUME CONTROL

This is used to adjust the volume of sound heard through the speakers or headphones. No sound is heard when the control is at the "∞" position. To increase the volume, turn the control slowly clockwise (↷).

❿ SUBSONIC SWITCH

When this switch is depressed, the Subsonic Filter indicator lights up and the subsonic filter is activated. The filter serves to attenuate frequencies lower than 15 Hz with a 6 dB/oct slope, and can therefore be used to suppress the ultra low range noise, generated by record warp. This noise cannot actually be heard by the ear, but it can cause intermodulation distortion and even speaker damage. Use the switch as required during record play.

⓫ LOUDNESS SWITCH

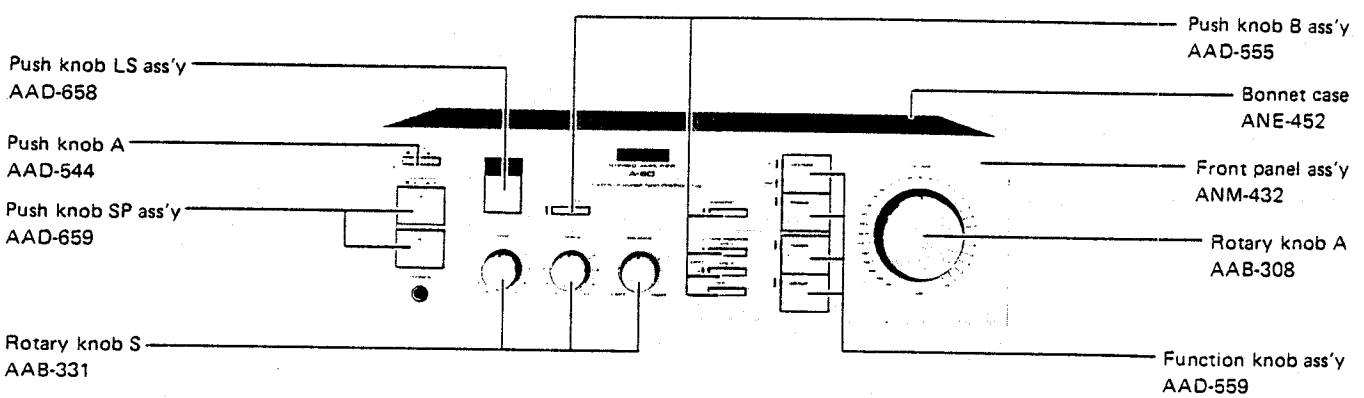
Depress this switch under low volume listening conditions. The Loudness indicator lights up and the bass and treble sound is emphasised.
When the volume of sound is low, the capability of the ear to pick up the bass and treble sound drops off, compared with high volume listening conditions. The loudness circuit compensates for this characteristic of the ear. The bass and treble are emphasised when the switch is set to ON and the sound comes alive, even when the volume is low.

NOTE:
The LOUDNESS switch does not operate if the LINE STRAIGHT switch is ON.

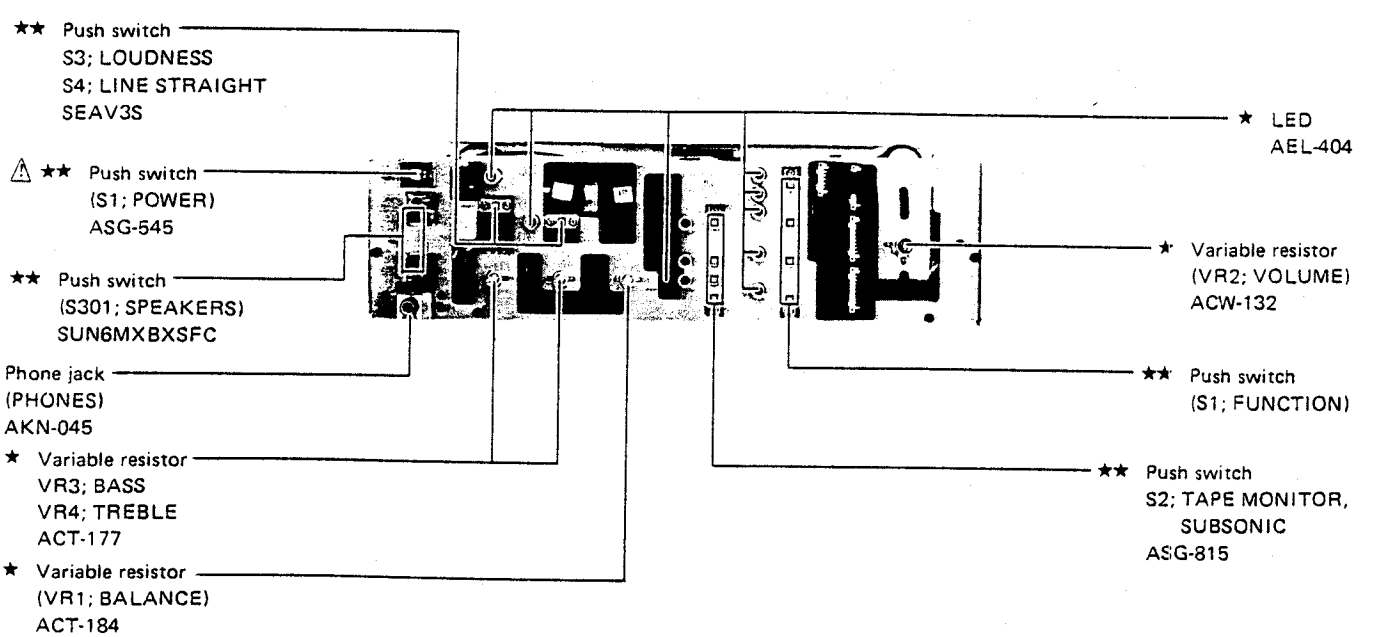
4. PARTS LOCATION

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

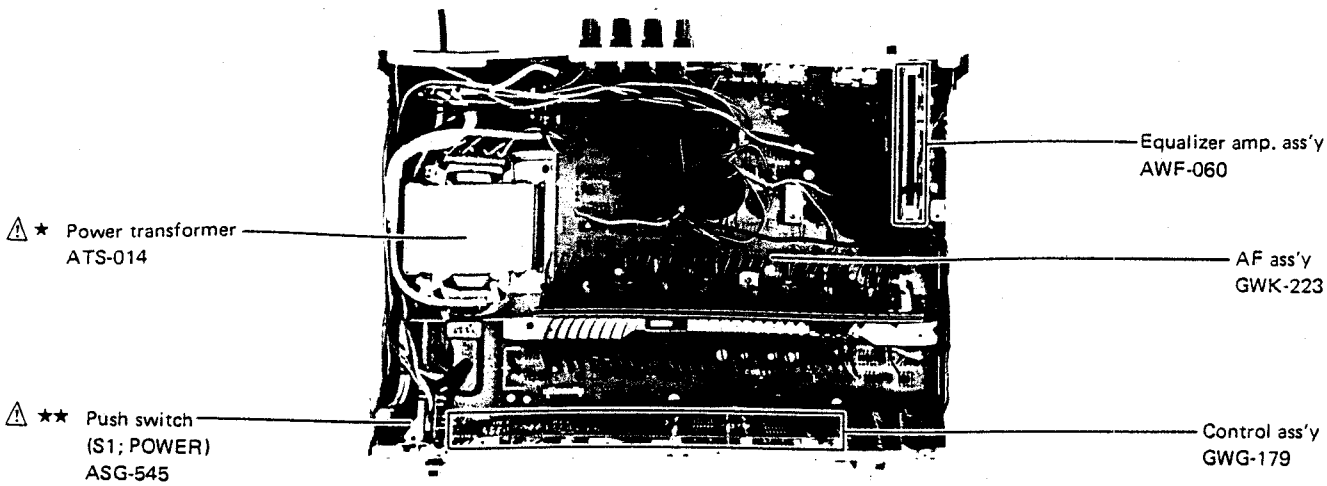
Front Panel View



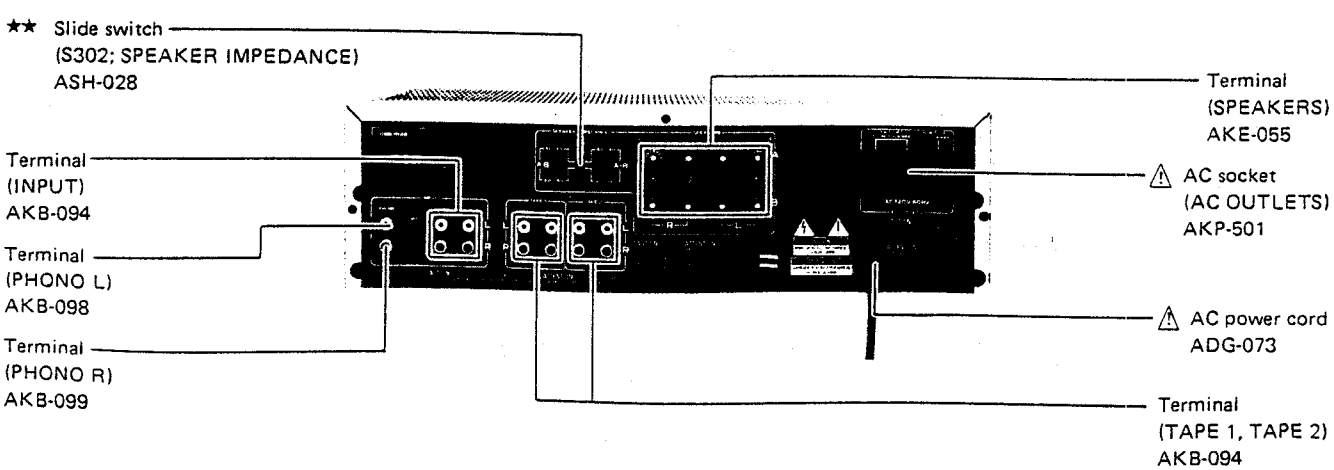
Front View with Panel Removed



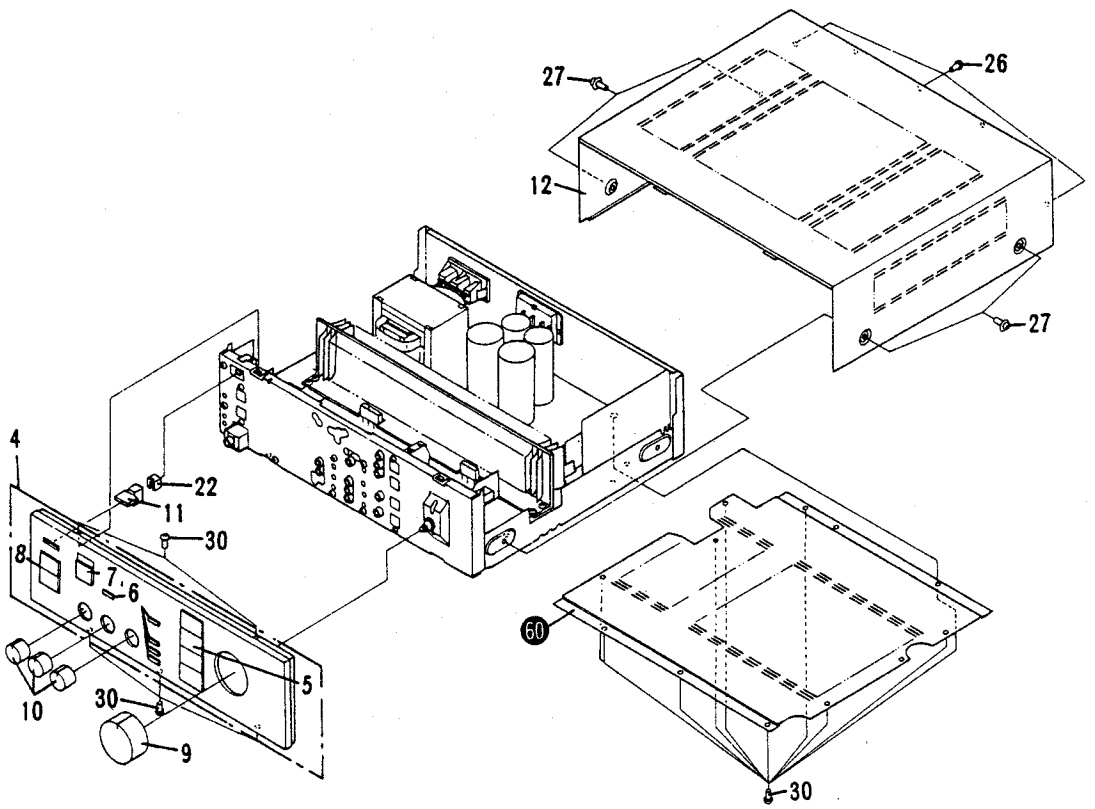
Top View with Bonnet Removed

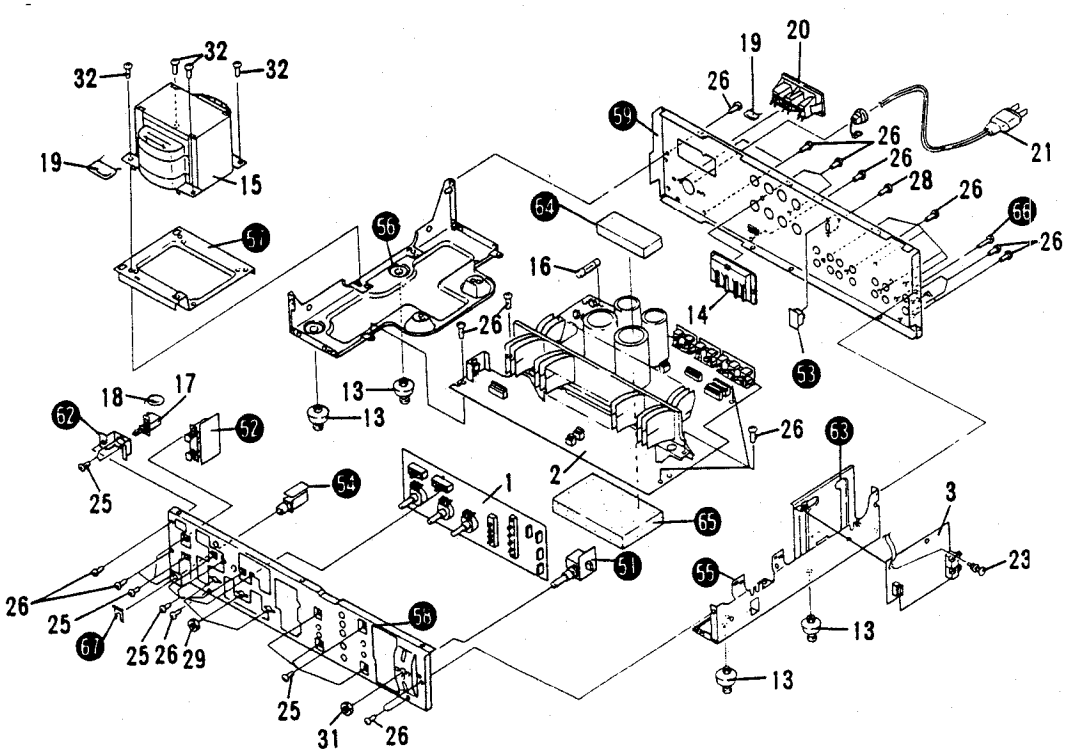


Rear Panel View



5. EXPLODED VIEW





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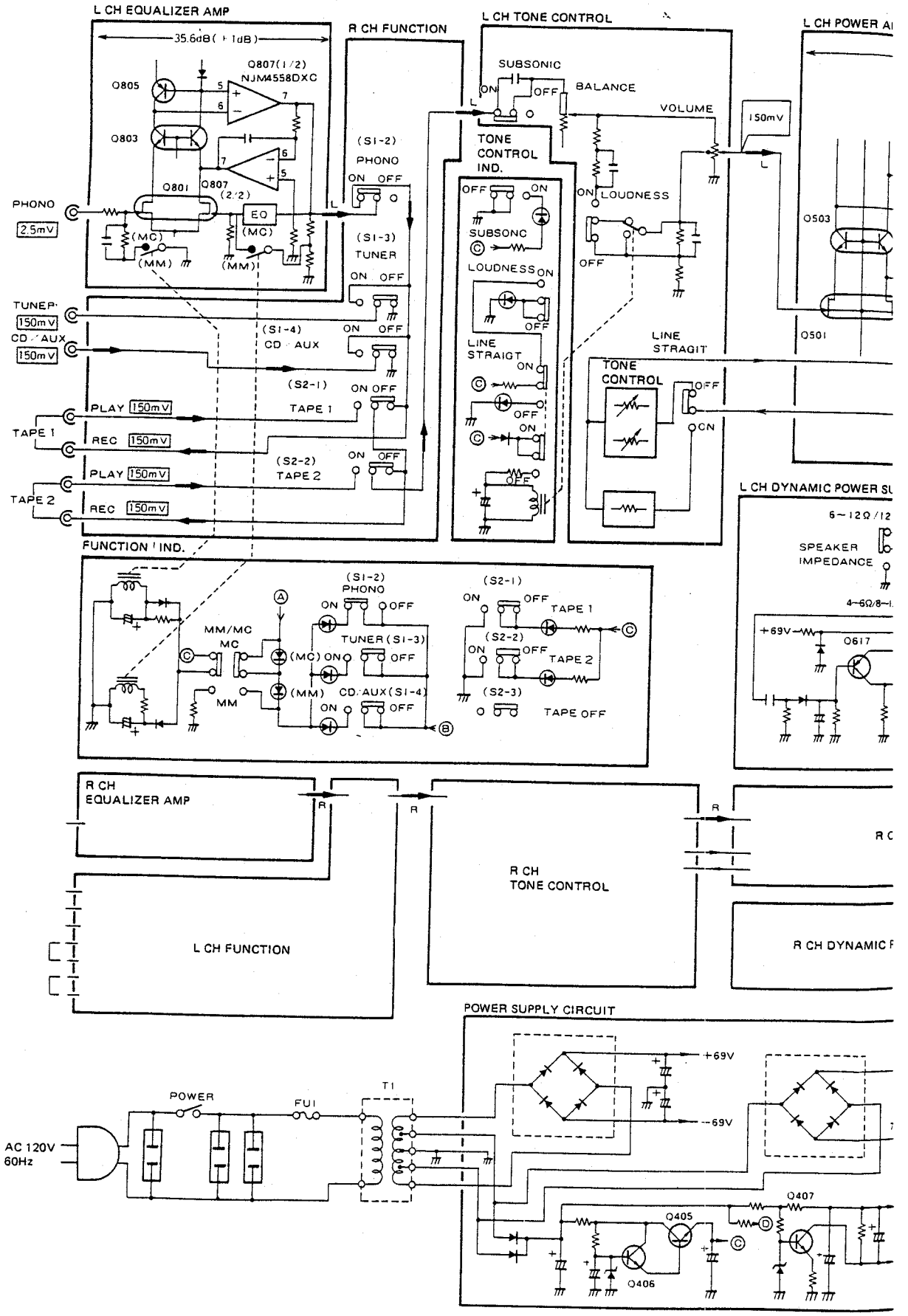
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Mark	No.	Part No.	Description
	1.	GWG-179	Control ass'y
	2.	GWK-223	AF ass'y
	3.	AWF-060	Equalizer amp. ass'y
	4.	ANM-432	Front panel ass'y
	5.	AAD-559	Function knob ass'y
	6.	AAD-555	Push knob B ass'y
	7.	AAD-658	Push knob LS ass'y
	8.	AAD-659	Push knob SP ass'y
	9.	AAB-308	Rotary knob A
	10.	AAB-331	Rotary knob S
	11.	AAD-544	Push knob A
	12.	ANE-452	Bonnet case
	13.	AEC-383	Foot ass'y
	14.	AKE-055	Terminal (SPEAKERS)
⚠	★ 15.	ATS-014	Power transformer (120V)
⚠	★★ 16.	AEK-309	Fuse (6.3A)
⚠	★★ 17.	ASG-545	Push switch (POWER)
⚠	18.	ACG-001	Capacitor (0.01/AC250V)
⚠	19.	ACE-214	Capacitor (0.22/AC125V)
⚠	20.	AKP-501	AC socket (AC OUTLETS)
⚠	21.	ADG-073	AC power cord
	22.	AEC-800	Flexible ring
	23.	AEC-525	Nylon rivet
	24.	.....	.....
	25.	VMZ30P060FZB	Screw (3 x 6)
	26.	BBZ30P080FZK	Screw (3 x 8)
	27.	FBT40P080FCR	Screw (4 x 8)
	28.	VMZ30P060FZK	Screw (3 x 6)
	29.	NK70FUL	Nut
	30.	VBZ30P080FMC	Screw (3 x 8)
	31.	ABN-028	Nut
	32.	VCZ30P060FMC	Screw (3 x 6)
	51.		VR ass'y
	52.		Push switch ass'y
	53.		Slide switch ass'y
	54.		Headphone jack ass'y
	55.		Right frame
	56.		Transformer frame
	57.		Transformer stay
	58.		Panel stay
	59.		Rear panel
	60.		Bottom plate

Mark	No.	Part No.	Description
	61.		.....
	62.		SW holder
	63.		Shielding case
	64.		Cushion A
	65.		Cushion B
	66.		Terminal (GND)
	67.		Mounting plate

6. BLOCK DIAGRAM



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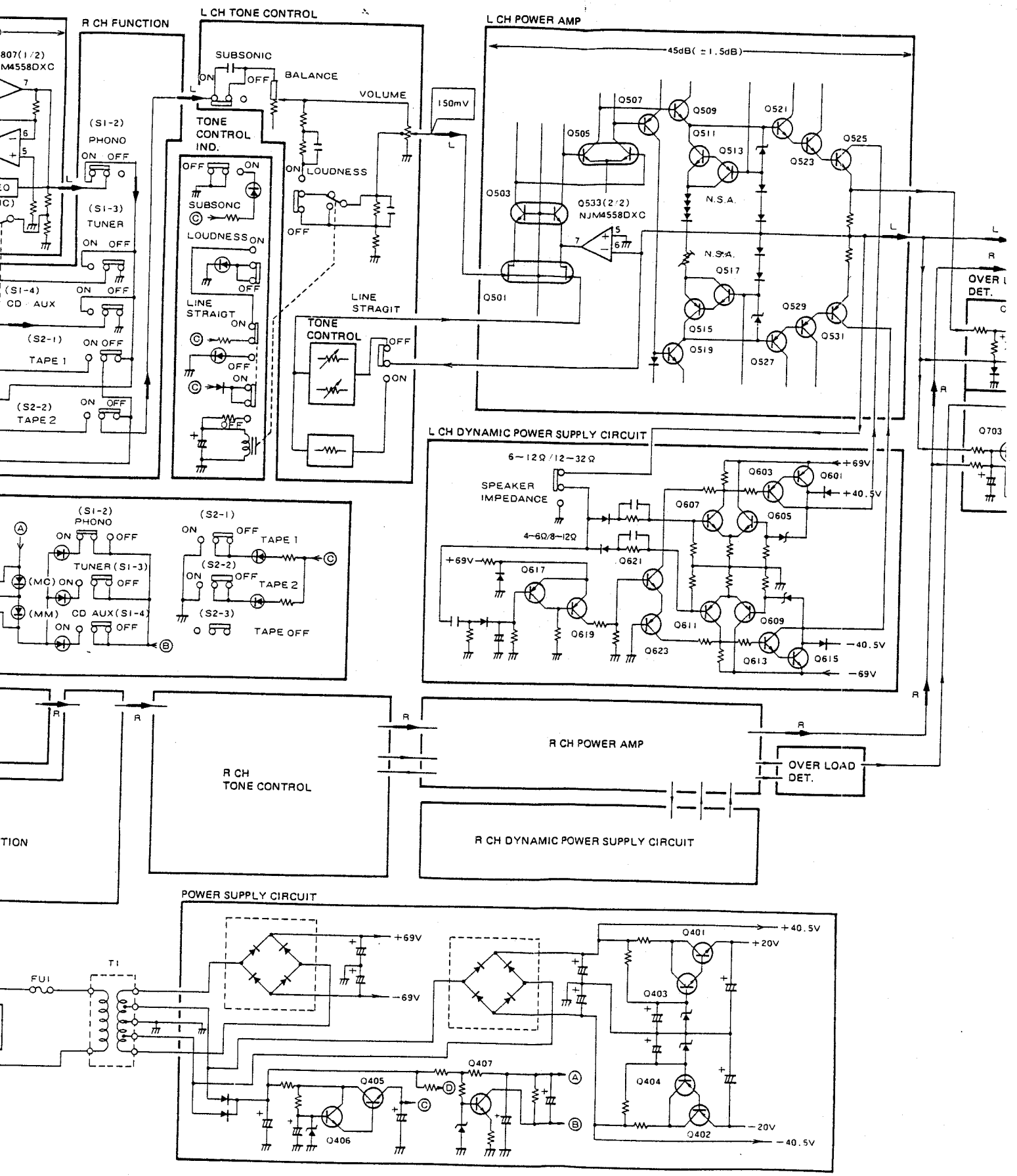
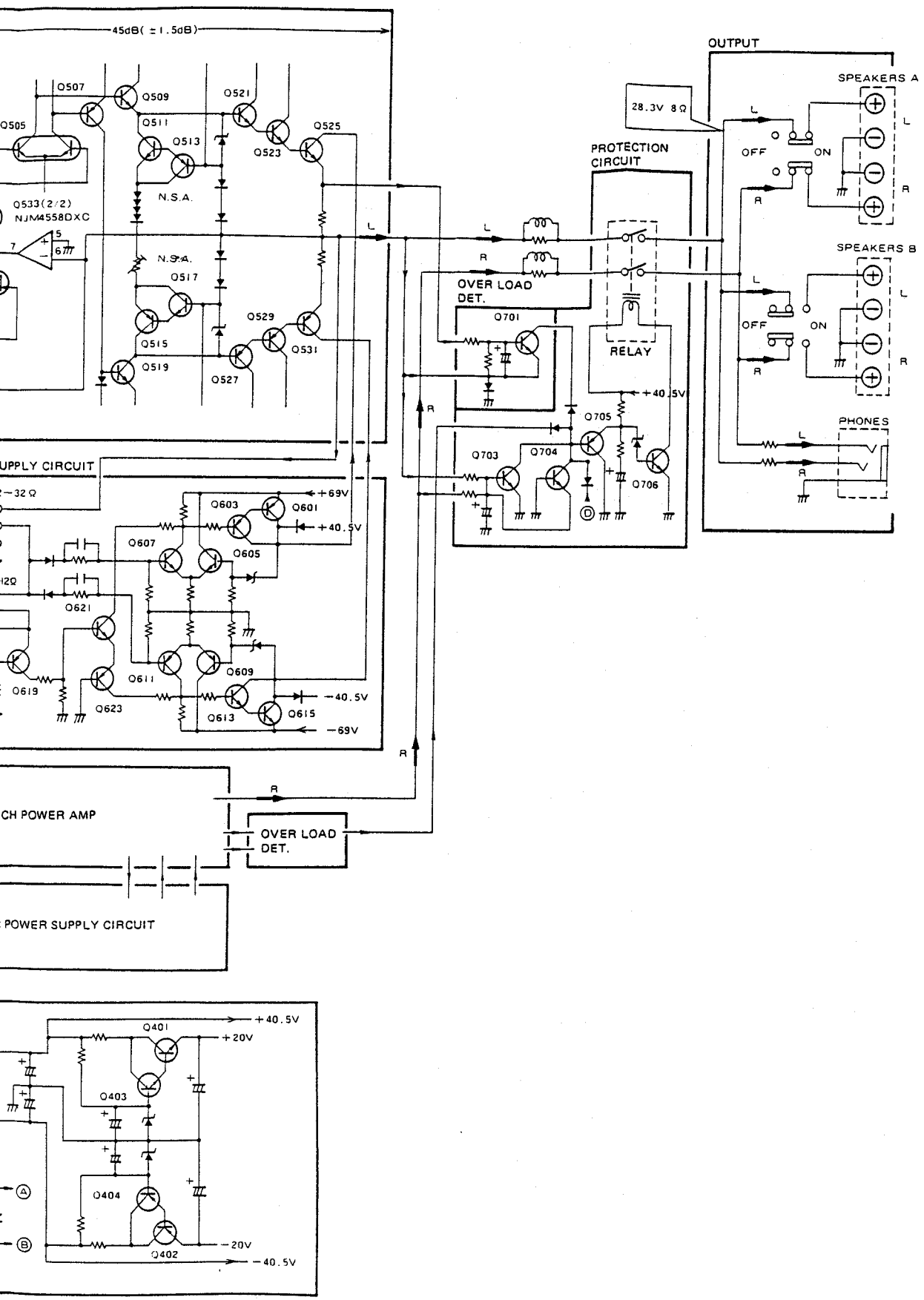

R CH FUNCTION
L CH TONE CONTROL
L CH POWER AMP
SUBSONIC
BALANCE
VOLUME
150mV
TONE CONTROL IND.
LOUDNESS
LINE STRAIGT
TONE CONTROL
45dB(±1.5dB)
Q507
Q509
Q521
Q505
Q511
Q513
Q525
Q523
Q503
Q533(2/2) NJM4558DXC
N.S.A.
Q517
Q501
Q529
Q515
Q531
Q519
Q527
OVER DET.
(S1-2) PHONO
(S1-3) TUNER
(S1-4) CD AUX
(S2-1) TAPE 1
(S2-2) TAPE 2
(S2-3) TAPE OFF
L CH DYNAMIC POWER SUPPLY CIRCUIT
SPEAKER IMPEDANCE
6~12Ω/12~32Ω
4~6Ω/8~12Ω
Q603
Q601
Q607
Q605
Q621
Q617
Q619
Q611
Q609
Q623
Q613
Q615
+69V
+40.5V
-40.5V
-69V
R CH TONE CONTROL
R CH POWER AMP
OVER LOAD DET.
R CH DYNAMIC POWER SUPPLY CIRCUIT
POWER SUPPLY CIRCUIT
FU1
T1
Q401
Q403
Q404
Q402
Q405
Q406
Q407
+20V
-20V


45dB(±1.5dB)
Q505
Q507
Q509
Q511
Q513
Q521
Q523
Q525
N.S.A.
Q533(2/2)
NJM4558DXC
Q517
Q515
Q519
Q527
Q529
Q531
OUTPUT
28.3V 8Ω
SPEAKERS A
SPEAKERS B
PHONES
OFF
ON
PROTECTION CIRCUIT
RELAY
OVER LOAD DET.
Q701
+40.5V
Q705
Q703
Q704
Q706
UPPLY CIRCUIT
Q603
Q601
+69V
+40.5V
Q607
Q605
Q621
Q619
Q611
Q609
Q623
Q613
Q615
−40.5V
−69V
CH POWER AMP
OVER LOAD DET.
POWER SUPPLY CIRCUIT
Q401
+40.5V
+20V
Q403
Q404
−20V
Q402
−40.5V

7. CIRCUIT DESCRIPTIONS

DYNAMIC POWER SUPPLY CIRCUIT

The dynamic power supply system featured in the final stage of the A-60 power amplifier varies the voltage applied to the power transistor in accordance to the signal level. The result is reduced heat loss and higher efficiency.

Operating Principles

The basic circuitry is outlined in Fig. 7-1. There are two V_H and V_L power lines. The signal output *vo* is compared with final stage power voltage *va* by differentiator, *va* being obtained by controlling V_H. With the *va* input applied to the differentiator being offset by Es (several volts), the *va* waveform is traced, *va* being several volts larger than *vo*. If, however, *vo* is less than V_L — Es, *va* is fixed at the V_L level (see Fig. 7-2).

The purpose of the high-region ON circuit is to avoid irregularities from occurring where *va* can no longer follow *vo* at high signal frequencies, and to prevent high-speed continuous operation in the control transistor. That is, when high frequency signals appear at the output, the control transistors (Q3 and Q4) are turned fully on, and *va* is fixed at the V_H level.

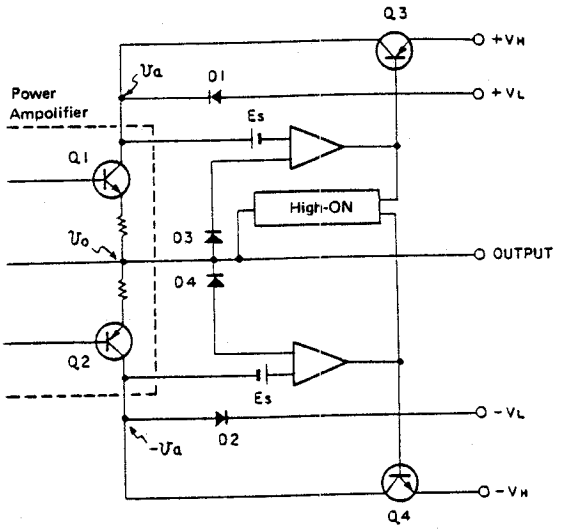


Fig. 7-1 Basic circuitry

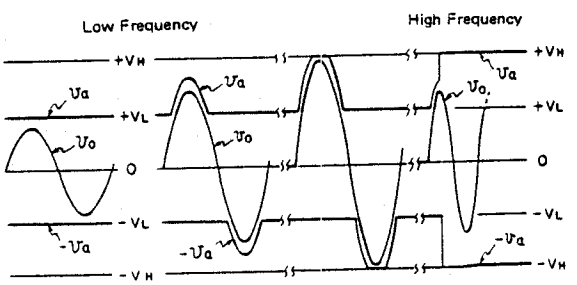


Fig. 7-2 Operating waveforms

A-60 Dynamic Power Supply Circuit

The overall circuit structure is outlined in Fig. 7-3. V_L is fixed so as to obtain the rated output (about 75W) for a 4Ω load, and the high region ON circuit is designed to operate at frequencies above 3kHz. The SPEAKER IMPEDANCE switch set to the 4Ω ~ 6Ω position fixes the power supply to the final stage transistor at the V_L level.

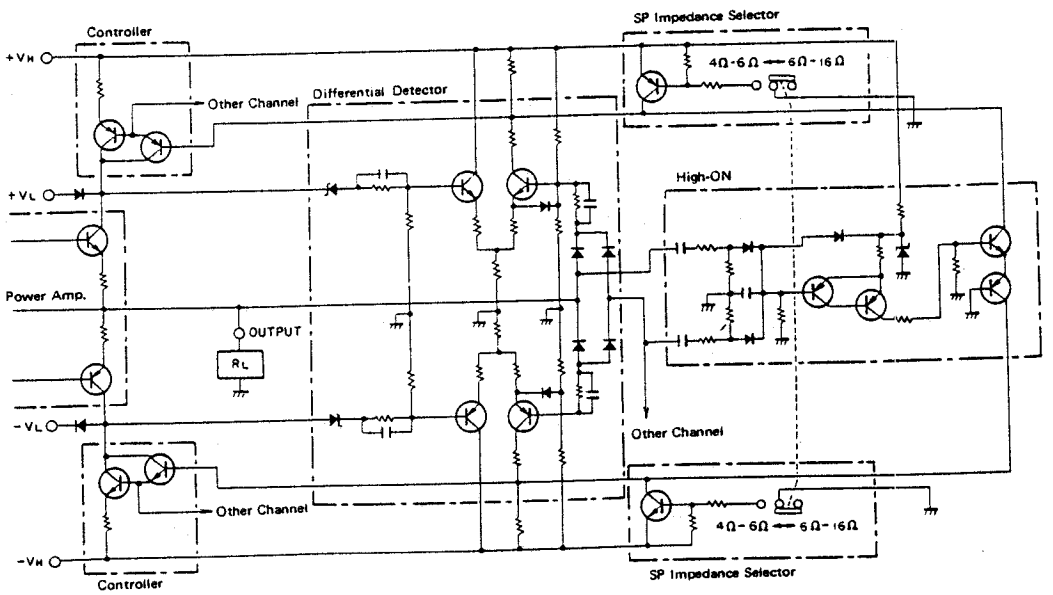
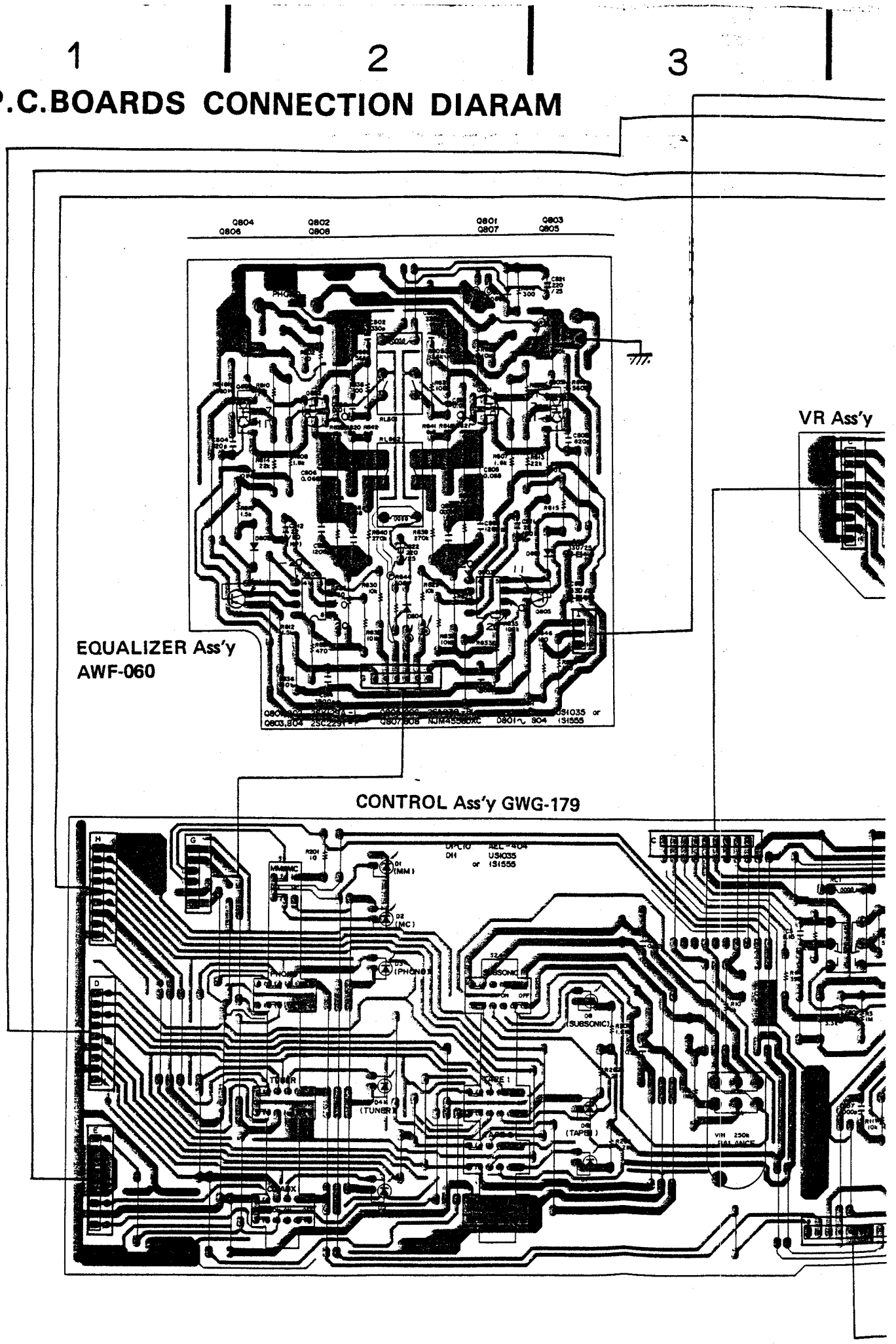
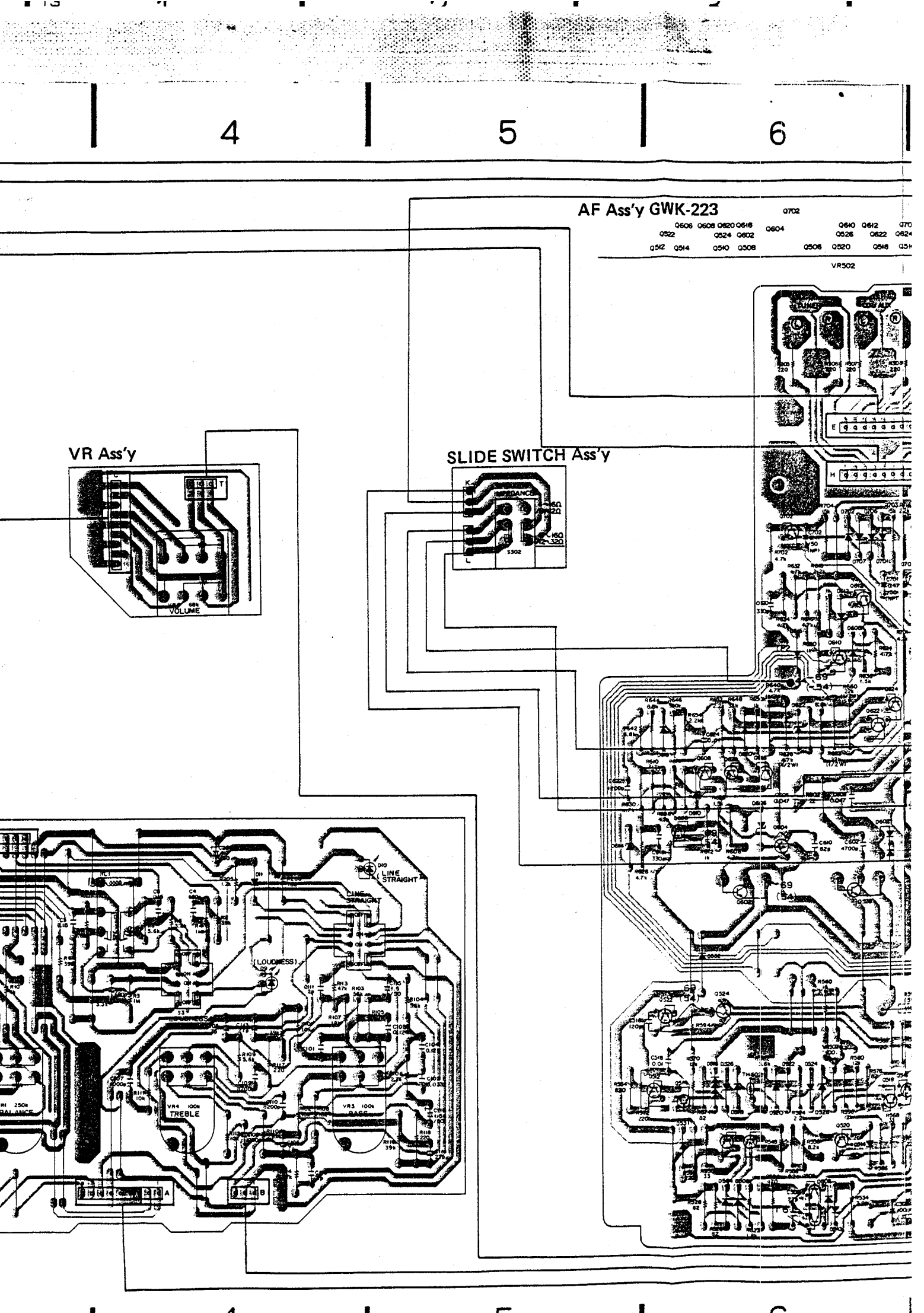


Fig. 7-3 A-60 Dynamic power supply circuit

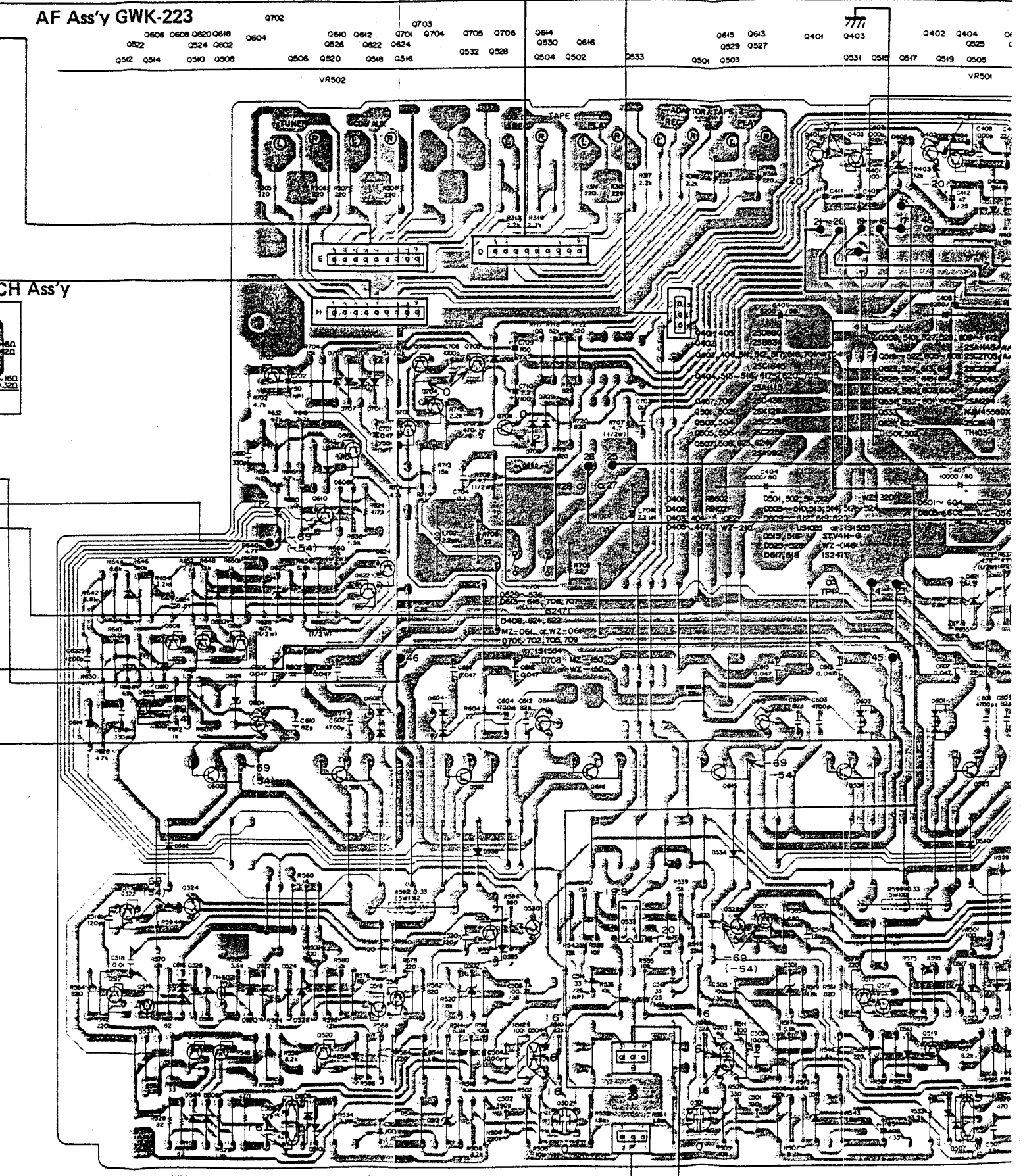
8. P.C.BOARDS CONNECTION DIARAM



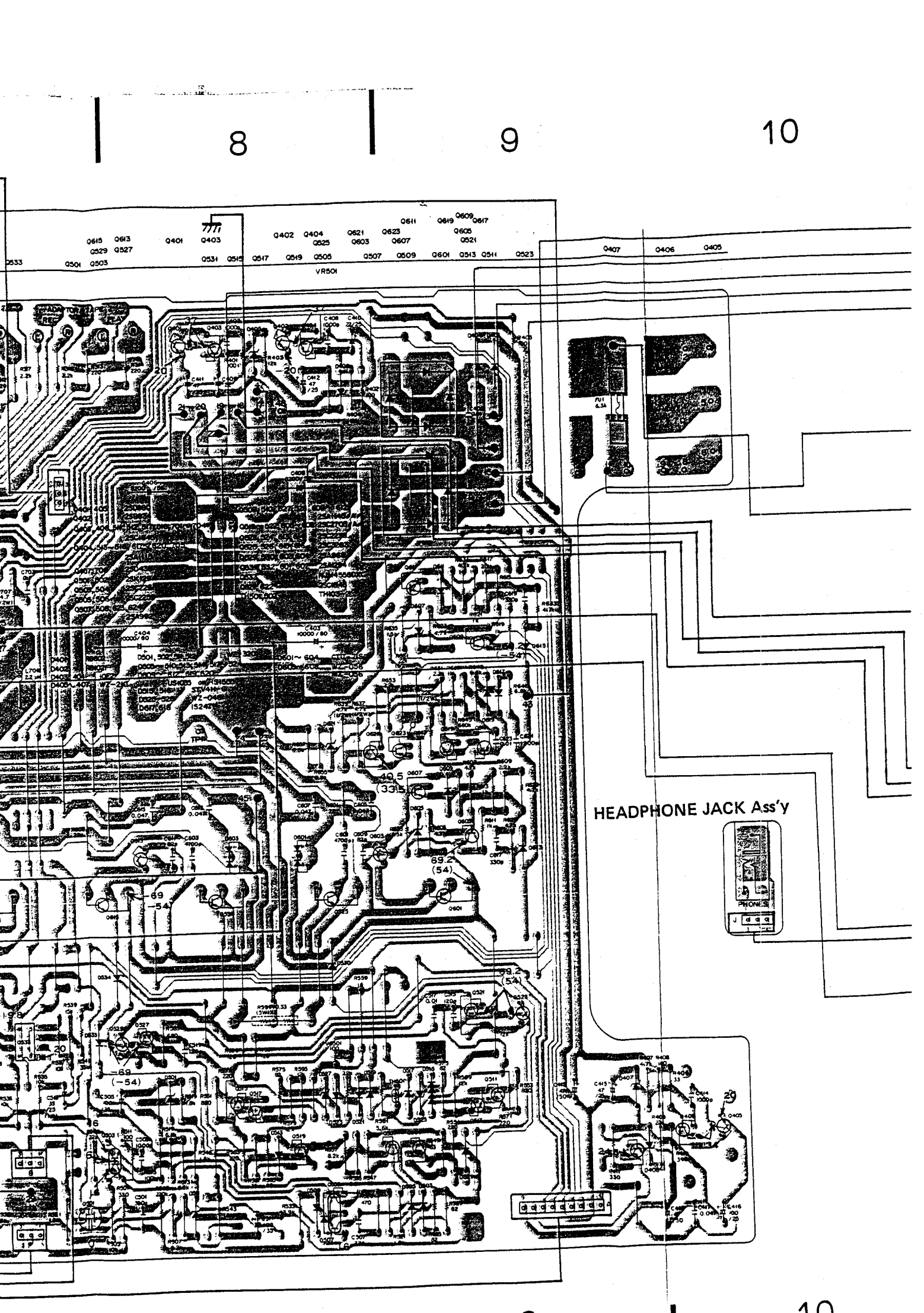

AF Ass'y GWK-223
VR Ass'y
SLIDE SWITCH Ass'y
VOLUME
IMPEDANCE
S302
(LOUDNESS)
LINE STRAIGHT
TREBLE
BASS
VR502

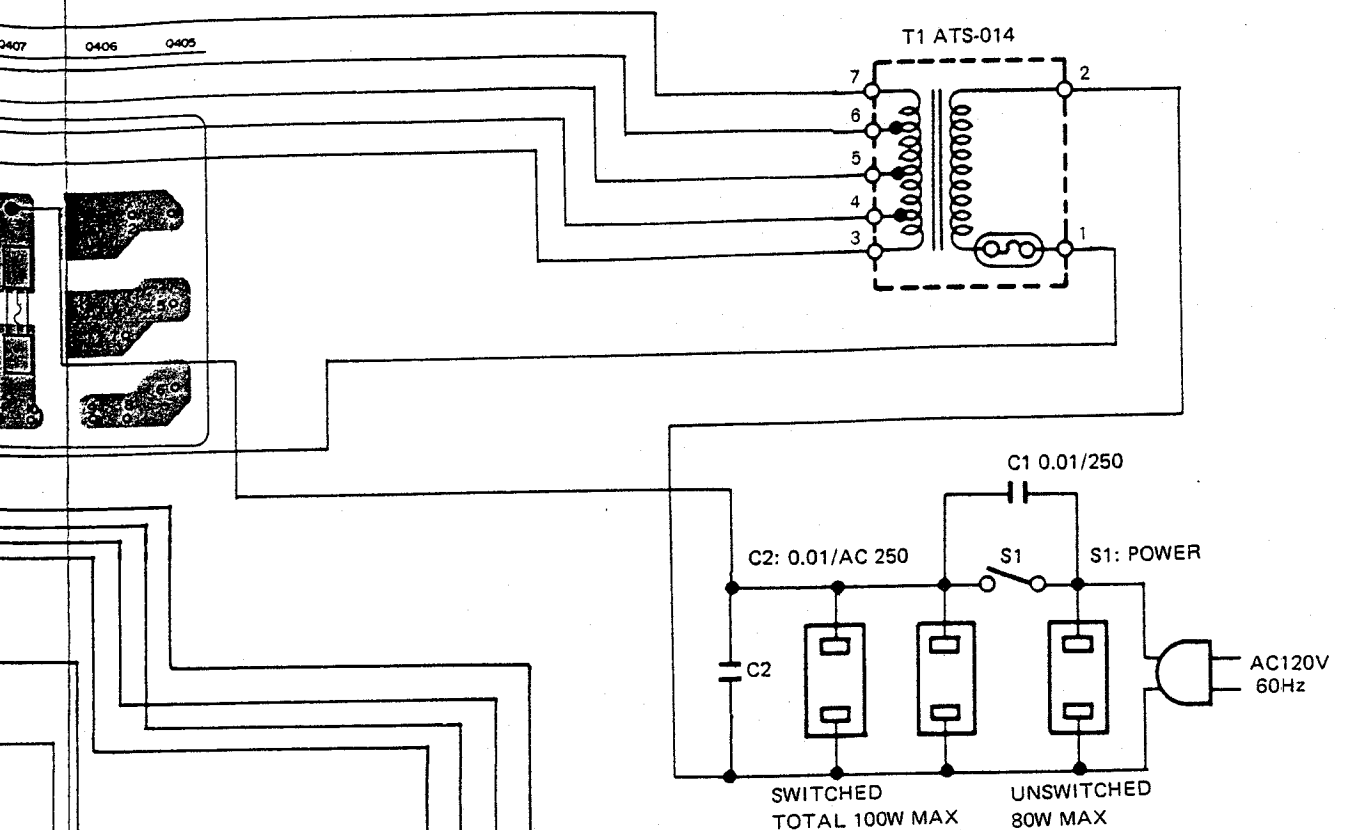
6 7 8

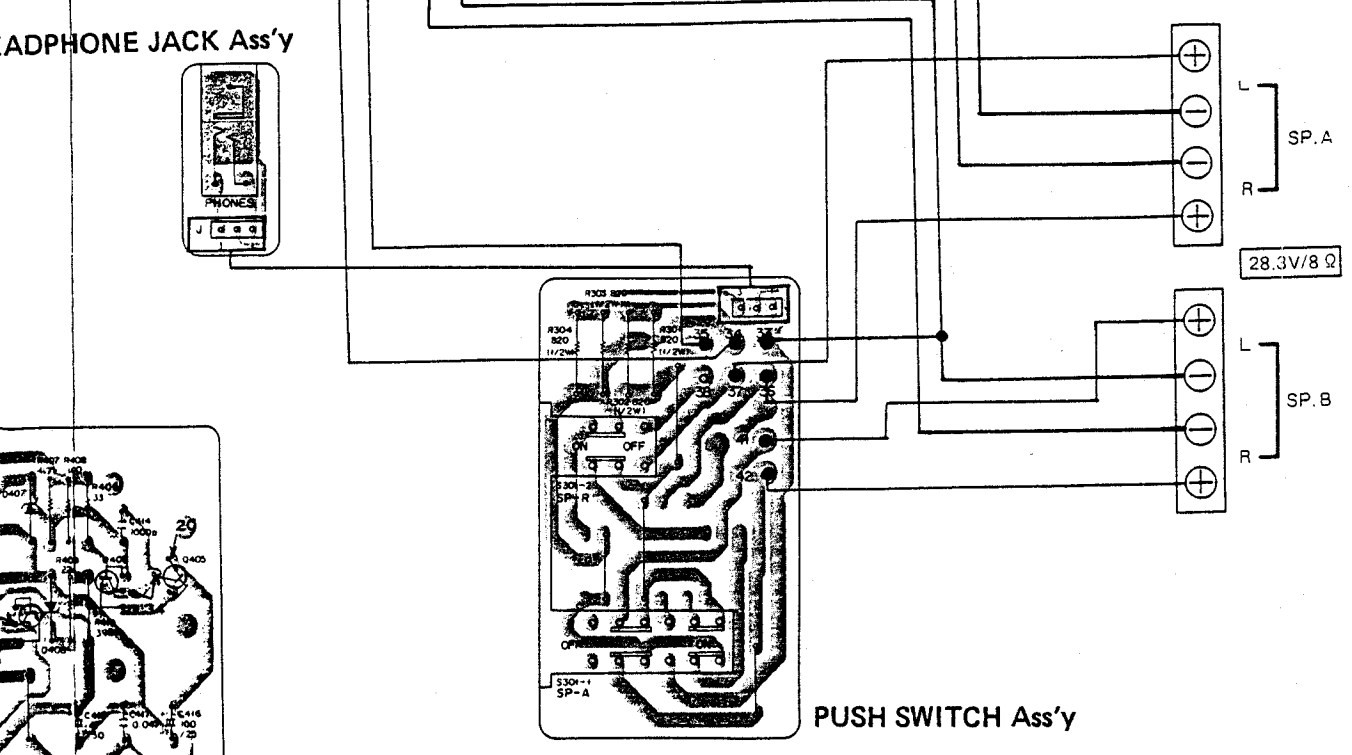
AF Ass'y GWK-223



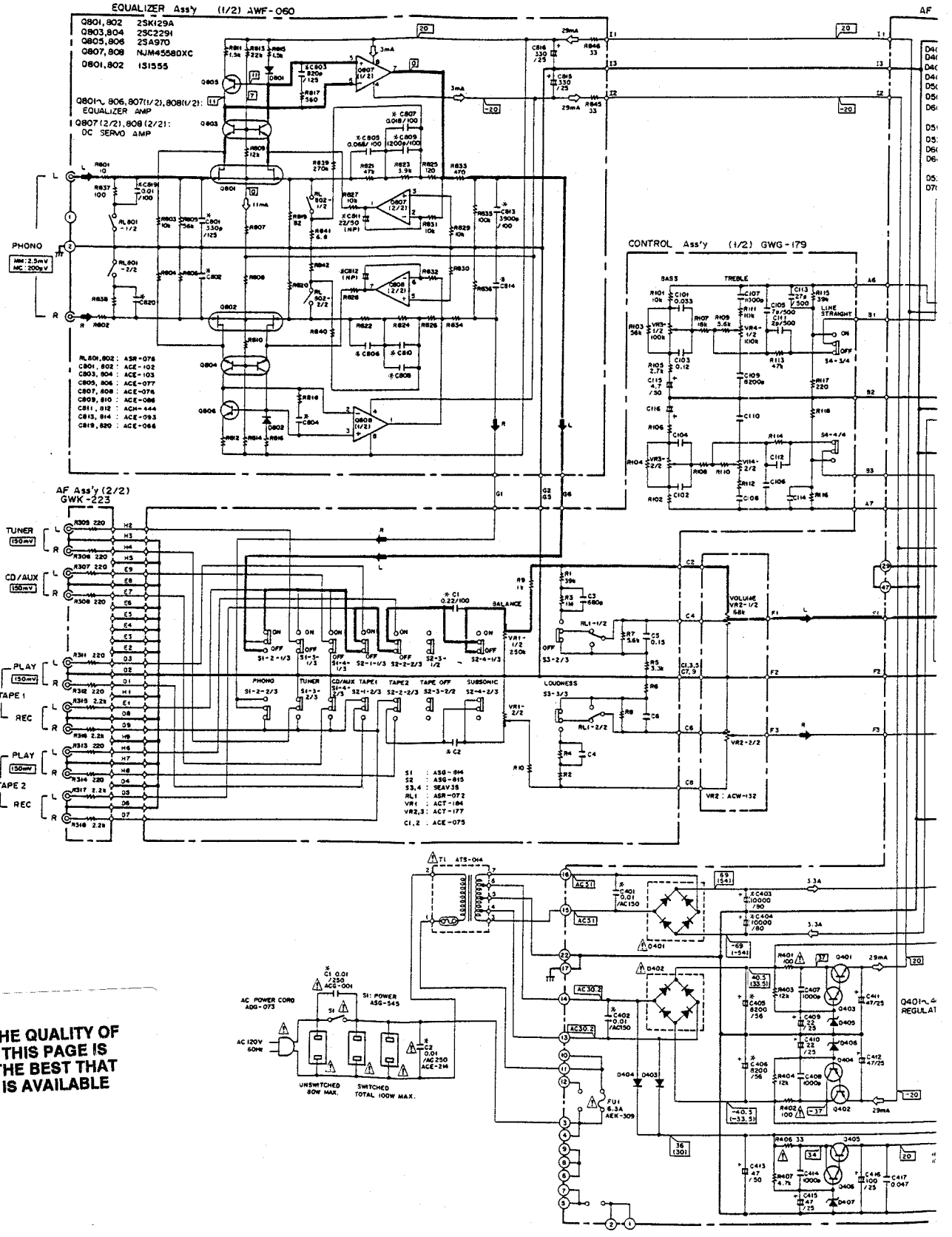
CH Ass'y


8
9
10
HEADPHONE JACK Ass'y
PHONES


T1 ATS-014
7
6
5
4
3
2
1
C1 0.01/250
C2: 0.01/AC 250
S1
S1: POWER
C2
AC120V
60Hz
SWITCHED
TOTAL 100W MAX
UNSWITCHED
80W MAX


EADPHONE JACK Ass'y
PHONES
L
R
SP.A
28.3V/8 Ω
L
R
SP.B
PUSH SWITCH Ass'y

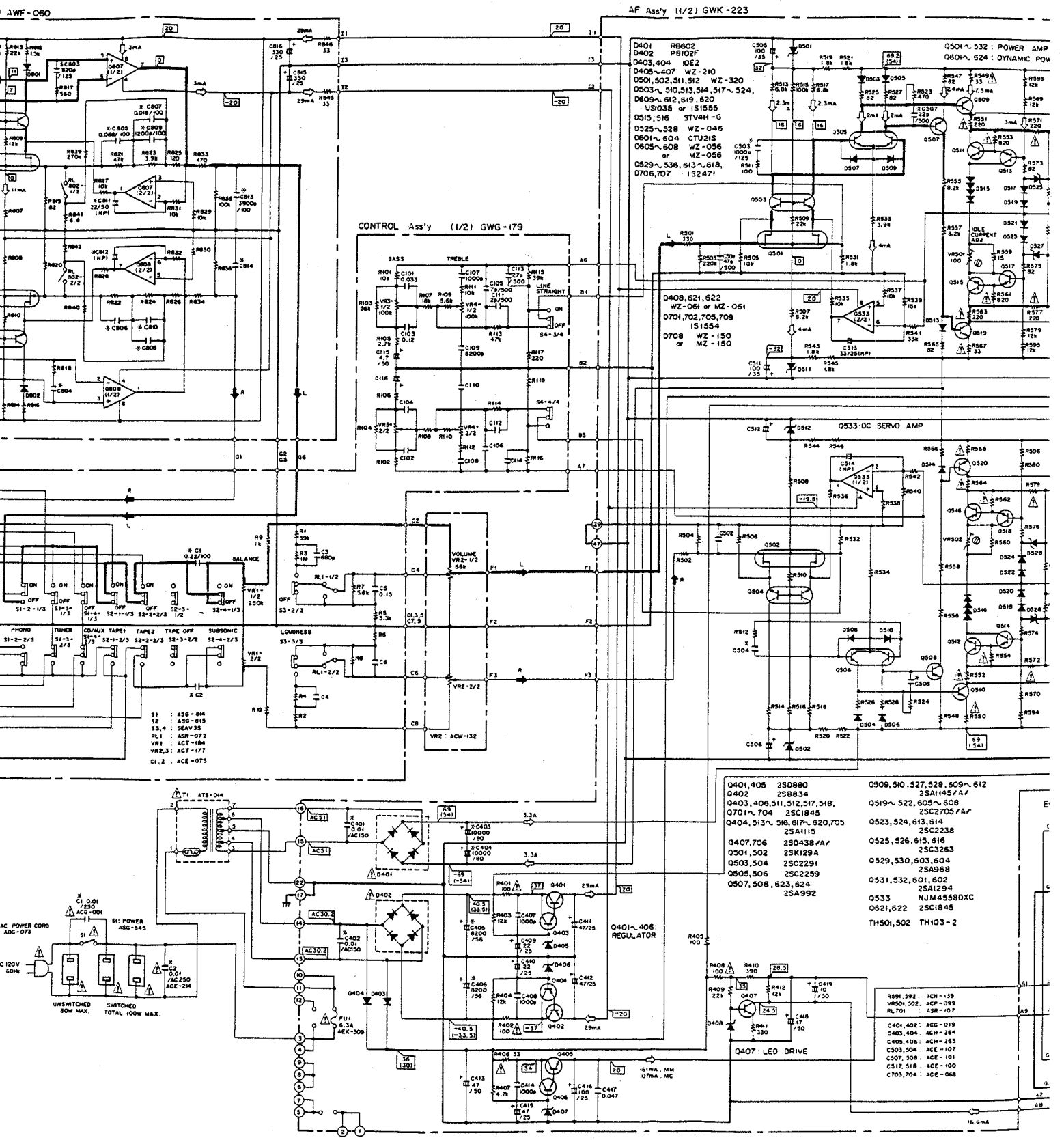
9. SCHEMATIC DIAGRAM



THE QUALITY OF THIS PAGE IS THE BEST THAT IS AVAILABLE

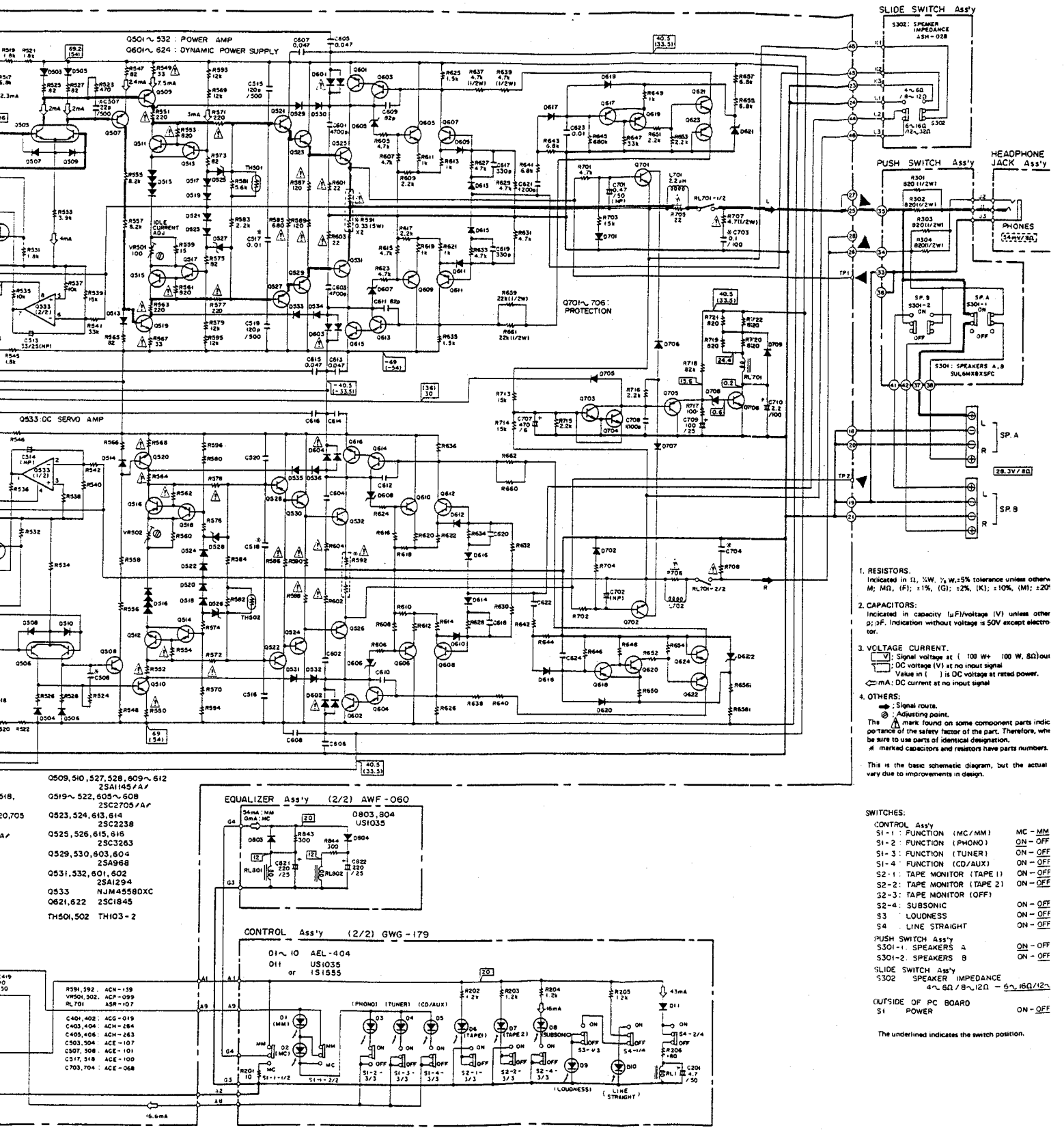
2 3 4

DIAGRAM



2 3 4

NOTE:
The indicated semiconductors are representative one. Other alternative semiconductors may be used a listed in the parts list.



Q509, 510, 527, 528, 609~612 2SA1145/A/
Q519~522, 605~608 2SC2705/A/
Q523, 524, 613, 614 2SC2238
Q525, 526, 615, 616 2SC3263
Q529, 530, 603, 604 2SA968
Q531, 532, 601, 602 2SA1294
Q533 NJM4558DXC
Q621, 622 2SC1845
TH501, 502 TH103-2

EQUALIZER Ass'y (2/2) AWF-060
0803, 804 US1035

CONTROL Ass'y (2/2) GWG-179
D1~10 AEL-404
D11 US1035 or 1S1555

R591, 592 : ACN-139
VR501, 502 : ACP-099
RL701 : ASR-107

C401, 402 : ACG-019
C403, 404 : ACH-264
C405, 406 : ACH-263
C503, 504 : ACE-107
C507, 508 : ACE-101
C517, 518 : ACE-100
C703, 704 : ACE-068

1. RESISTORS.
Indicated in Ω, ¼W, ⅛ W, ±5% tolerance unless otherwise M; MΩ, (F); ±1%, (G); ±2%, (K); ±10%, (M); ±20%

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise p; pF. Indication without voltage is 50V except electrolytic.

3. VOLTAGE CURRENT.
[V]: Signal voltage at (100 W+ 100 W, 8Ω)out
: DC voltage (V) at no input signal
Value in ( ) is DC voltage at rated power.
⇦mA: DC current at no input signal

4. OTHERS:
➡ : Signal route.
⊘ : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
* marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuitry may vary due to improvements in design.

SWITCHES:

CONTROL Ass'y
S1-1 : FUNCTION (MC/MM) MC – MM
S1-2 : FUNCTION (PHONO) ON – OFF
S1-3 : FUNCTION (TUNER) ON – OFF
S1-4 : FUNCTION (CD/AUX) ON – OFF
S2-1 : TAPE MONITOR (TAPE 1) ON – OFF
S2-2 : TAPE MONITOR (TAPE 2) ON – OFF
S2-3 : TAPE MONITOR (OFF)
S2-4 : SUBSONIC ON – OFF
S3 : LOUDNESS ON – OFF
S4 : LINE STRAIGHT ON – OFF

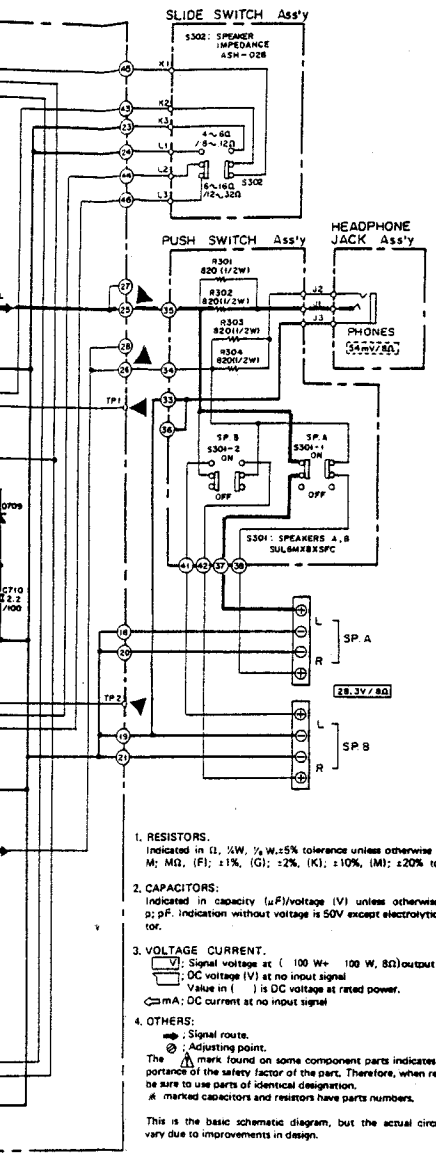
PUSH SWITCH Ass'y
S301-1 : SPEAKERS A ON – OFF
S301-2 : SPEAKERS B ON – OFF

SLIDE SWITCH Ass'y
S302 SPEAKER IMPEDANCE 4~6Ω/8~12Ω – 6~16Ω/12~32Ω

OUTSIDE OF PC BOARD
S1 POWER ON – OFF

The underlined indicates the switch position.

d semiconductors are representative ones only.
ative semiconductors may be used and are
parts list.



1. RESISTORS.
Indicated in Ω, ¼W, ⅙ W, ±5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F); ±1%, (G); ±2%, (K); ±10%, (M); ±20% tolerance

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE CURRENT.
V; Signal voltage at (100 W+ 100 W, 8Ω)output (1kHz)
; DC voltage (V) at no input signal
; Value in ( ) is DC voltage at rated power.
mA; DC current at no input signal

4. OTHERS:
; Signal route.
; Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

SWITCHES:

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S1-1 : FUNCTION (MC/MM) MC - MM
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S1-4 : FUNCTION (CD/AUX) ON - OFF
S2-1 : TAPE MONITOR (TAPE 1) ON - OFF
S2-2 : TAPE MONITOR (TAPE 2) ON - OFF
S2-3 : TAPE MONITOR (OFF)
S2-4 : SUBSONIC ON - OFF
S3 : LOUDNESS ON - OFF
S4 : LINE STRAIGHT ON - OFF

PUSH SWITCH Ass'y
S301-1 : SPEAKERS A ON - OFF
S301-2 : SPEAKERS B ON - OFF

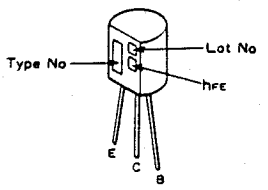
SLIDE SWITCH Ass'y
S302 : SPEAKER IMPEDANCE
4~6Ω / 8~12Ω - 6~16Ω / 12~32Ω

OUTSIDE OF PC BOARD
S1 : POWER ON - OFF

The underlined indicates the switch position.

External Appearance of Transistors and IC's

2SA970



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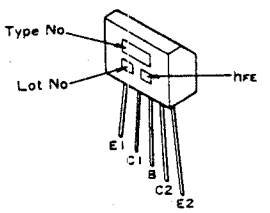

A

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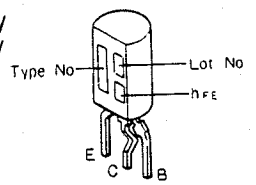
2SC2705/A/



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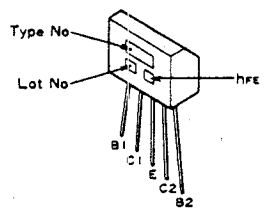
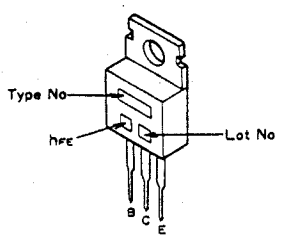
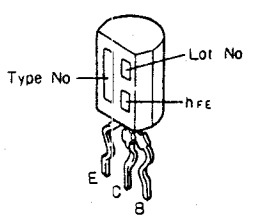


2SB834
2SA968
2SC2238
2SD880



2SD438/A/



B

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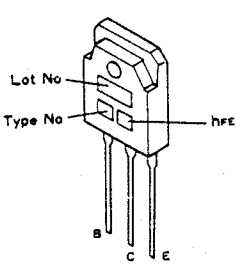
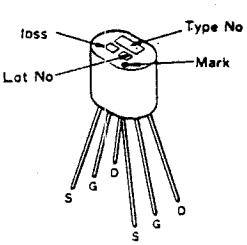
2SC3263



2SK129A



C

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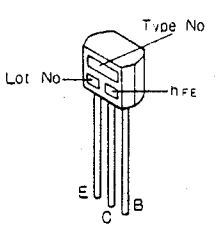
2SC2603



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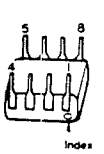
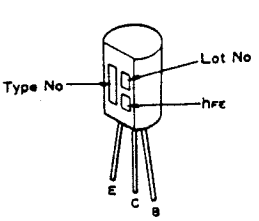


For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
8 Cherry Tree Rd, Chinnor
Oxon OX9 4QY
Tel:- 01844-351694 Fax:- 01844-352554
Email:- enquiries@mauritron.co.uk

2SA992
2SC1845



D

10. ELECTRICAL PARTS LIST

NOTES:

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

  Ex.1 *When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).*

560Ω	56×10^1	561	.....	RD¼PS 5 6 1 J
47kΩ	47×10^3	473	.....	RD¼PS 4 7 3 J
0.5Ω	0R5		.....	RN2H 0 R 5 K
1Ω	010		.....	RS1P 0 1 0 K

  Ex. 2 *When there are 3 effective digits (such as in high precision metal film resistors).*

5.62kΩ	562 x 100	5621	.....	RN¼SR 5 6 2 1 F

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Miscellaneous Parts List

Mark	Part No.	Symbol & Description
	GWK-223	AF ass'y
	AWF-060	Equalizer amp. ass'y
	no supply	VR ass'y
	no supply	Push switch ass'y
	no supply	Slide switch ass'y
	no supply	Headphone jack ass'y
⚠ ★	ATS-014	T1 Power transformer (120V)
⚠ ★★	AEK-309	FU1 Fuse (6.3A)
⚠ ★★	ASG-545	S1 Push switch (POWER)
⚠	ACG-001	C1 Capacitor (0.01/AC 250V)
⚠	ACE-214	C2 Capacitor (0.22/AC 125V)
⚠	AKP-501	AC socket (AC OUTLETS)
⚠	ADG-073	AC power cord

AF Ass'y (GWK-223)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
	2SD880	Q401, Q405
	2SK129A	Q501, Q502
	2SC2291	Q503, Q504
	2SC2259	Q505, Q506
	2SC2705/A/	Q519–Q522, Q605–Q608
	2SA1145/A/	Q509, Q510, Q527, Q528, Q609–Q612
	2SC2238	Q523, Q524, Q613, Q614
	2SA968	Q529, Q530, Q603, Q604
	2SC3263	Q525, Q526, Q615, Q616
	2SA1294	Q531, Q532, Q601, Q602
	2SD438/A/	Q407, Q706
	2SB834	Q402
	NJM4558DXC	Q533
	2SC1845	Q621, Q622, Q701, Q702
	2SA992	Q507, Q508, Q623, Q624
	2SC2603	Q403, Q406, Q511, Q512, Q517, Q518, Q703, Q704
	2SA1115	Q404, Q705, Q513–Q516, Q617–Q620
⚠	RB602	D401
⚠	PB102F	D402
	10E2FD	D403, D404
⚠	CTU-21S	D601–D604
	STV4H-G	D515, D516
	WZ-056	D525–D628
	WZ-046	D605–D608
	WZ-061 (MZ-061)	D408, D621, D622
	WZ-150 (MZ-150)	D708
	WZ-210	D405–D407
	WZ-320	D501, D502, D511, D512
	US1035 (1S1555)	D503–D510, D513, D514, D517–D524, D609–D612, D619, D620
	1S1554	D701, D702, D705, D709
	1S2471	D529–D536, D613–D618, D706, D707
	TH103-2	TH501, TH502

CAPACITORS

Mark	Part No.	Symbol & Descriptions
	ACG-019	C401, C402 (0.01/AC150V)
	ACH-264	C403, C404 (10000/80V)
	ACH-263	C405, C406 (8200/56V)
	CQSA 391J 50	C501, C502
	CMA 121J 500	C515, C516, C519, C520
	CMA 220J 500	C507, C508
	ACE-071	C503, C504 (1000p/125V)
	ACE-092	C517, C518 (0.0068/100V)
	ACE-067	C703, C704 (0.1/100V)
	CEANP R47M 50	C701, C702
	CEANP 330M 25	C513, C514
	CKDYF 103Z 50	C623, C624
	CEA 2R2M 100L	C710
	CEA 220M 25L	C409, C410
	CEA 470M 25L	C411, C412, C415
	CEA 470M 50L	C413, C418
	CEA 101M 25L	C416, C709
	CEA 101M 35L	C505, C506, C511, C512
	CEA 471M 6L	C707
	CCDSL 820J 50	C609–C612
	CKDYB 331K 50	C617–C620
	CKDYB 102K 50	C407, C408, C414, C708
	CKDYB 122K 50	C621, C622
	CKDYF 472Z 50	C601–C604
	CKDYF 473Z 50	C417, C605–C608, C613–C616

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	ACP-099	VR501, VR502
⚠	ACN-139	R591, R592
⚠	RD¼PMFL □□□J	R553, R554, R561, R562, R585, R586
	RFA¼PS □□□J	R551, R552, R563, R564, R571, R572, R577, R578
	RDH1/8P □□□J	R501–R504, R531, R532
	RD½PSF □□□J	R707, R708
	RFA¼PS □□□J	R705–R706, R587–R590
⚠	RFA¼PS □□□J	R401, R402, R405, R406, R549, R601
⚠		–R604, R550–R552, R563, R564, R567, R571, R572, R577, R578
	RD½PS □□□J	R637–R640, R659–R662
	RD¼PM □□□J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	AKB-094	4P Pin jack (INPUT, TAPE)
	ATH-054	L701, L702 AF choke coil
	ASR-107	RL701 Relay
	ABA-258	Screw
	BBZ30P080FZK	Screw
	PBZ30P060FMC	Screw
	AEC-818	Screw

Push Switch Ass'y

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	RD½PS □□□J	R301–R304

OTHERS

Mark	Part No.	Symbol & Description
	SUN6MXBXSFC	S301 Push switch (SPEAKERS)

Slide Switch Ass'y

Mark	Part No.	Symbol & Description
	ASH-028	S302 Slide switch

Headphone Jack Ass'y

Mark	Part No.	Symbol & Description
	AKN-045	Phone jack (PHONES)

Equalizer Amp. Ass'y (AWF-060)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
	2SK129A	Q801, Q802
	2SC2291	Q803, Q804
	NJM4558DXC	Q807, Q808
	2SA970	Q805, Q806
	US1035 (1S1555)	D801–D804

CAPACITORS

Mark	Part No.	Symbol & Description
	ACE-102	C801, C802 (330p/125V)
	ACE-076	C807, C808 (0.018/100V)
	ACE-077	C805, C806 (0.068/100V)
	ACE-086	C809, C810 (1200p/100V)
	ACE-093	C813, C814 (3900p/100V)
	ACE-066	C819, C820 (0.01/100V)
	ACH-444	C811, C812 (22/50V, NP)
	ACE-103	C803, C804 (820p/125V)
	CEA 331M 25L	C815, C816
	CEA 221M 25L	C821, C822

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	RD¼PM □□□ J	R843, R844
	RDH1/8P □□□ J	R819–R824, R841, R842
	RDH1/8P □□□ J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	ASR-076	RL801, RL802 Relay
	AKB-098	1P Pin jack (White)
	AKB-099	1P Pin jack (Red)

Control Ass'y (GWG-179)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
	AEL-404	D1–D10
	US1035 (1S1555)	D11

SWITCHES

Mark	Part No.	Symbol & Description
	ASG-814	S1 Push switch (FUNCTION)
	ASG-815	S2 Push switch (TAPE SUB)
	SEAV3S	S3 Push switch (LOUDNESS)
	SEAV3S	S4 Push switch (LINE STRAIGHT)

CAPACITORS

Mark	Part No.	Symbol & Description
	ACE-075	C1, C2 (0.22/100V)
	CQMLA 124K 50	C103, C104
	CQMLA 154K 50	C5, C6
	CMA 020D 500	C111, C112
	CMA 070D 500	C105, C106
	CMA 270J 500	C113, C114
	CQSA 681J 50	C3, C4
	CEA 4R7M 50L	C201
	CQMA 102K 50	C107, C108
	CQMA 822K 50	C109, C110
	CEA 1R5M 50L	C115, C116
	CQMA 333K 50	C101, C102

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	ACT-184	VR1 Variable (250k, BALANCE)
	ACT-177	VR3, VR4 Variable (100k, TONE)
	RDH1/8P □□□ J	R9, R10, R115–R118
	RD¼PM □□□ J	Other resistors

OTHERS

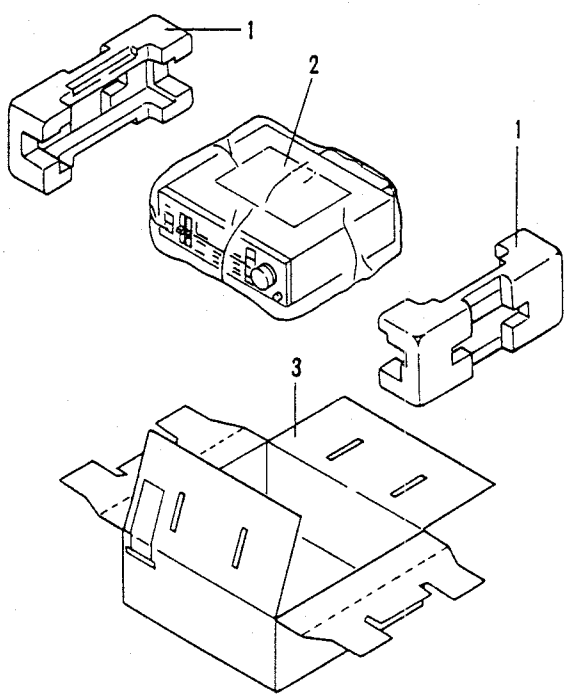
Mark	Part No.	Symbol & Description
	ASR-072	RL1 Relay

VR Ass'y

Mark	Part No.	Symbol & Description
	ACW-132	VR2 Variable resistor (68k, VOLUME)

11. PACKING

Mark	No.	Part No.	Description
	1.	AHA-344	Side pad
	2.	ARB-555	Operating instructions
	3.	AHE-221	Packing case

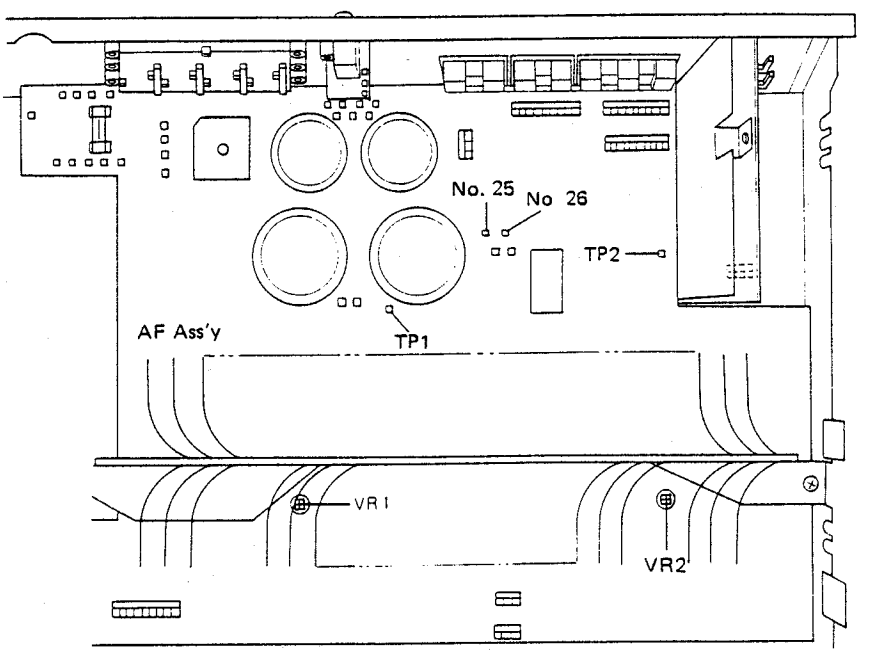


12. ADJUSTMENTS

Idle Current Adjustment

- Turn VR1 (L) and VR2 (R) fully around in the counter-clockwise direction.
- Without any load or input signal, turn POWER switch ON and let stand for 10 minutes.

Adjustment point	Prescribed value	Measuring terminal
VR1 (L)	0.5mV~5mV	TP1 (+) and No. 25
VR2 (R)	0.5mV~5mV	TP2 (+) and No. 26

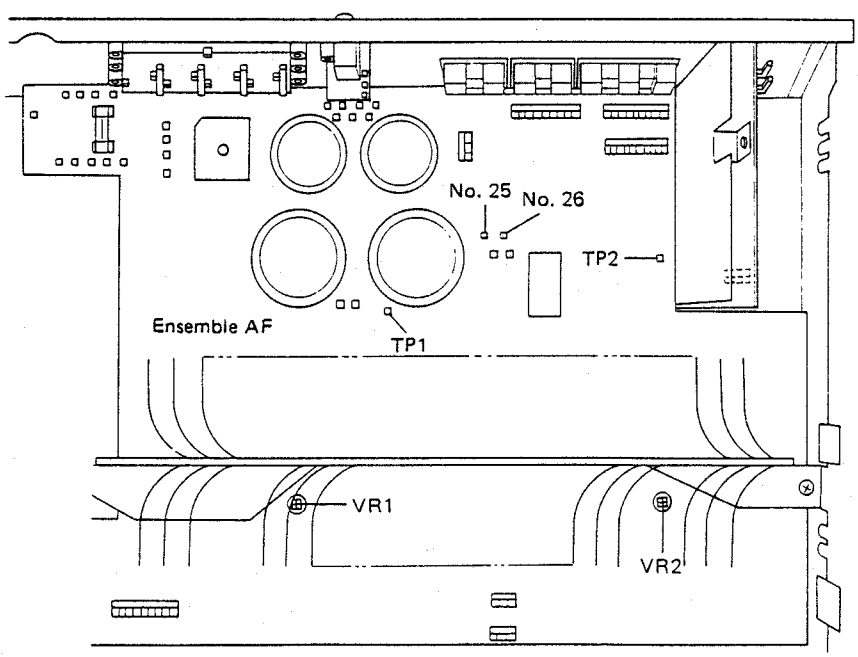


12. RÉGLAGE

Réglage du courant dewatté

- Tourner à fond VR1 (L, gauche) et VR2 (R, droite) en sens inverse des aiguilles d'une montre.
- Sans charge ni signal d'entrée, allumer l'interrupteur POWER et le maintenir 10 minutes.

Point de réglage	Valeur prescrite	Terminal de mesure
VR1 (L)	0,5mV~5mV	TP1 (+) et N° 25
VR2 (R)	0,5mV~5mV	TP2 (+) et N° 26

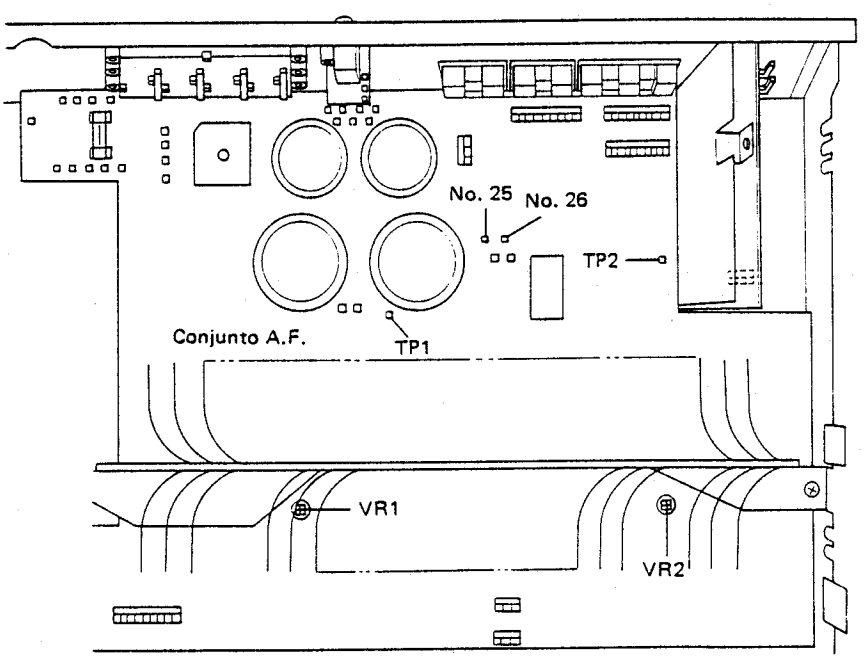


12. AJUSTE

Ajuste de la corriente la corriente devatiada

- Girar la VR1 (L, izquierda) VR2 (R, derecha) totalmente en la dirección hacia la izquierda.
- Sin ninguna carga o señal de entrada, girar el interruptor de la alimentación (POWER) a ON y manténgalo por 10 minutos.

Punto de ajuste	Valor determinado	Terminal de medida
VR1 (L)	0,5mV~5mV	TP1 (+) y no. 25
VR2 (R)	0,5mV~5mV	TP2 (+) y no 26



13. FOR HE, HB AND YP TYPES

The HE, HB, and YP types are the same as the KU type with the exception of the following sections.

Contrast of Miscellaneous Parts

Mark	Symbol & Description	Part No.				Remarks
		KU type	HE type	HB type	YP type	
	AF ass'y	GWK-223	GWK-231	GWK-231	GWK-231	
⚠ ★	T1 Power transformer (120V)	ATS-014	.....	.....	.....	
	Power transformer (220V/240V)	.....	ATS-027	ATS-027	ATS-027	
⚠ ★★	FU1 Fuse (6.3A)	AEK-309	.....	.....	.....	
	Fuse (T500mA)	.....	AEK-401	AEK-401	.....	
	Fuse (T3.15A)	.....	.....	.....	AEK-042	
⚠ ★★	FU2 Fuse (T3.15A)	.....	AEK-042	AEK-042	.....	
⚠ ★★	FU3 Fuse (T500mA)	.....	AEK-401	AEK-401	.....	
⚠	C1 Capacitor (0.01/AC250V)	ACG-001	.....	.....	.....	
	Capacitor (0.01/AC125V)	.....	ACG-502	ACG-502	ACG-502	
⚠	C2 Capacitor (0.22/AC125V)	ACE-214	.....	.....	.....	
	Capacitor (0.22/AC250V)	.....	ACE-215	ACE-215	ACE-215	
	AC socket	AKP-501	AKP-502	AKP-505	.....	
	AC power cord	ADG-073	ADG-068	ADG-063	ADG-064	
	Operating instructions (English)	ARB-555	.....	ARB-555	ARB-555	
	(English French, German, Italian)	.....	ARE-073	.....	.....	
	Packing case	AHE-221	AHE-252	AHE-221	AHE-221	

AF Ass'y (GWK-231)

The AF ass'y GWK-231 (for HE, HB and YP types) is the same as the GWK-223 (for KU type) with the exception of following sections.

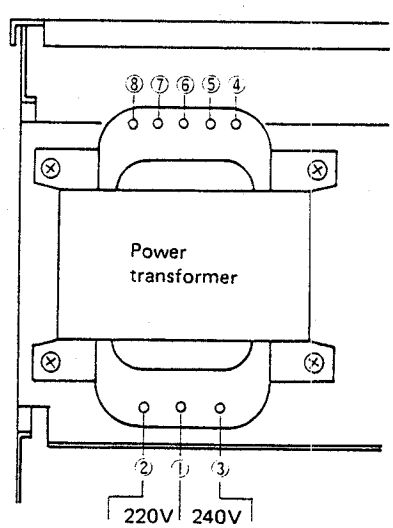
Mark	Symbol & Description	Part No.		Remarks
		GWK-223	GWK-231	
	R410 R533, R534, R607–R610 R615–R618, R625–R636	RD¼PM □□□J	RD¼MFL □□□J	

Line Voltage Selection

Line voltage can be changed with following steps.

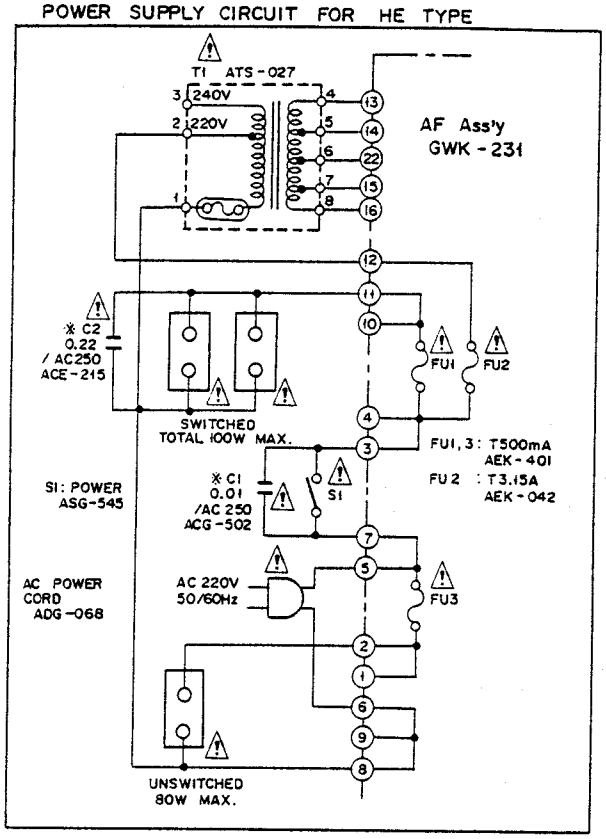
1. Disconnect the AC power cord.
2. Remove the top cover.
3. Change the connection of the power transformer primary taps.
4. Stick the line voltage label on the rear panel.

Part No.	Description
AAX-193	220V label
AAX-192	240V label

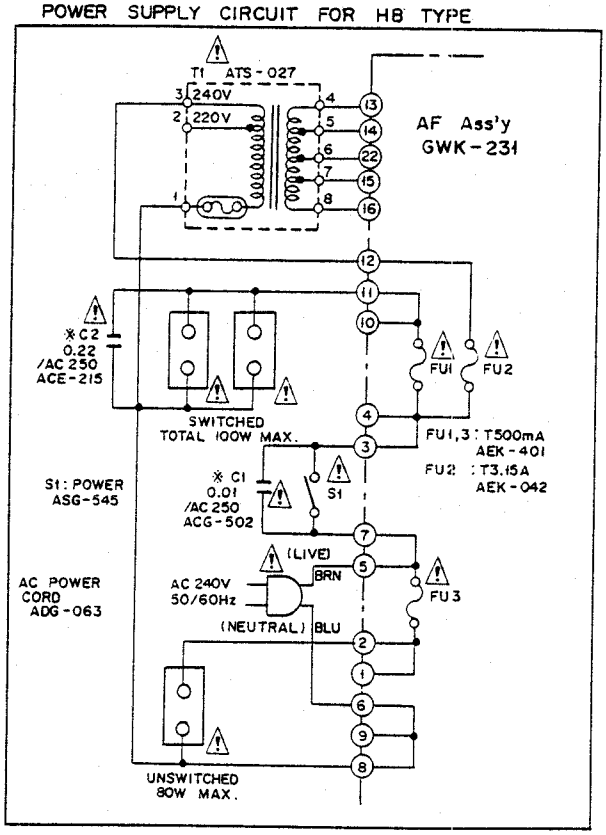


Schematic Diagram

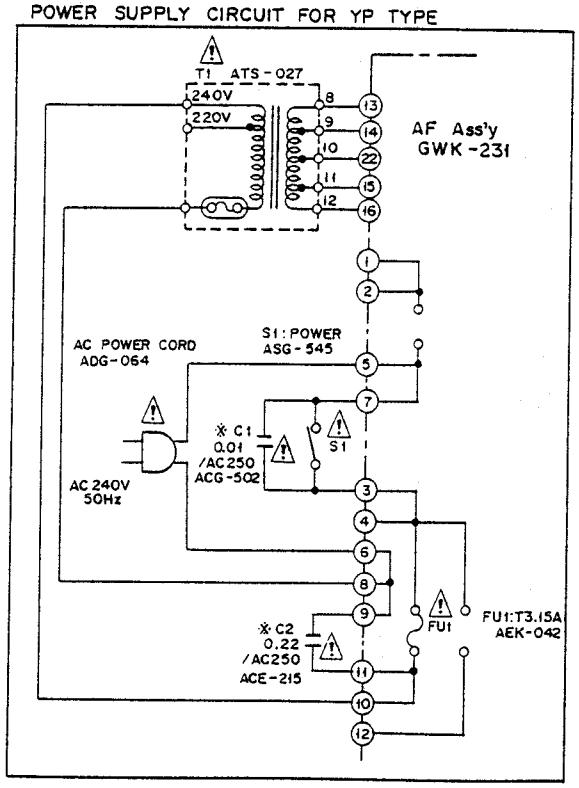
POWER SUPPLY CIRCUIT FOR HE TYPE



POWER SUPPLY CIRCUIT FOR HB TYPE



POWER SUPPLY CIRCUIT FOR YP TYPE



14. FOR S TYPE

The S type is the same as the KU type with the exception of the following sections.

Contrast of Miscellaneous Parts

Mark	Symbol & Description	Part No.		Remarks
		KU type	S type	
⚠ ★	T1 Power transformer			
	(120V)	ATS-014	.....	
	(110V, 120V, 220V, 240V)	.....	ATS-049	
⚠ ★★	FU1 Fuse (6.3A)	AEK-309	.....	
	Fuse (3.15A)	.....	AEK-124	
⚠ ★★	FU2 Fuse (3.15A)	.....	AEK-124	
⚠	S2 Line voltage selector	.....	AKX-503	
⚠	C2 Capacitor (0.22/AC125V)	ACE-214	.....	
	Capacitor (0.22/AC250V)	.....	ACE-215	
⚠	AC power cord	ADG-073	ADG-060	
	Operating instruction (English)	ARB-555	ARB-555	
	(Spanish)	.....	ARC-058	

POWER SUPPLY CIRCUIT FOR S TYPE